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STUDENT ASSESSMENT SELECTION BEHAVIOR ANALYSIS OF INSTITUTIONS CONDUCTING DISTANCE EDUCATION

THESIS

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THESIS

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Clayton W. Sammons

Table of Contents

Page

List of Figures

List of Tables

Abstract

The study explores issues universities consider when deciding what types of assessments will be used for distance education students. Many universities conduct distance education courses electronically but frequently do not execute assessments electronically. Universities across the country, diversified by academic rankings, tuition, and student population were interviewed for this study.

Results generally revealed security concerns as the most prevalent reason for universities avoiding electronic assessments. However, some universities created evaluation methods to mitigate the security risks and performed electronic assessments such as projects or exams designed to reduce the possibility of cheating. Examples of these types of assessments include requiring students to interpret material discussed during the course, using questions that require more than looking up the answers in course material, or asking personal questions that only the student should know. These are not foolproof, but do lessen the risk of cheating.

A majority of the universities' representatives indicated faculty tends to resist changes, particularly technological changes. Several of the schools have faculties that, for the most part, are not connected to a network or utilize electronic mail. Consequently, technological limitations are restricting the potential capabilities of the faculty. However, the universities' representatives implied that if the faculty were given the resources they would still tend to resist.

The author's recommendation for universities is to reevaluate their perceptions of the students and the potential capabilities that new technologies can provide to the curriculum.

STUDENT ASSESSMENT SELECTION BEHAVIOR ANALYSIS OF INSTITUTIONS CONDUCTING DISTANCE EDUCATION

I. Introduction

General Issue

Across the United States, thousands of students enroll in courses via distance education. All students have their individual reasons for selecting these courses, but convenience is the most common reason. If convenience is the primary reason for choosing a course via distance education, why is the entire course, assessment included, not completed in the same fashion? The research demonstrates that typically, a course conducted electronically will have a paper-based, proctored assessment. Communication with the instructor is accomplished through electronic mail, chat rooms, or bulletin boards. For example, a student could receive course materials and instruction in electronic format such as an Internet-based course. However, when the assessment is required, a student must find an acceptable proctor to witness the execution of the graded, paper-based examination. Is this necessary?

There are technologies and strategies that can reduce the opportunity and therefore the likelihood of cheating. Have institutions considered these strategies and technologies? Or, is it possible universities have evaluated the technologies and strategies and are still unwilling to risk the potential embarrassment of awarding credit for a course a student did not complete honestly?

The literature does not reveal the answer to this issue. However, to complete the research, a preceding question was asked. What issues do academic institutions consider when deciding what types of course assessments are acceptable in the realm of distance education? This question should directly reveal why a diverse group of universities provides various types of distance education courses and yet, as a whole, does not conduct assessments the same way (Burgess, 1994; Spille and others, 1997). Are institutions convinced that students will simply cheat or is there another reason for this apparent disconnect? The preponderance of academic institutions in the United States use paper-based, proctored assessments. These assessments are typically created, administered, and evaluated by the faculty or representative. The primary goal of an assessment is to determine whether a student achieved the desired level of understanding and has the ability to apply the information learned (Brigance and Hargis, 1993; Jacobi and others, 1987; Kean, 1994).

The idea of distance education is not new. Over the years, students have used videotapes, television, or similar methods of one-way communication to receive the course instruction. Recently, technology has provided the ability and the impetus to use video-teleconferencing, two-way audio and video interactive lectures, and Internet courses as viable methods of delivering course instruction to the student.

Background

Distance education has been around for generations with its roots in correspondence programs. The United States Naval War College established the College of Continuing Education in 1914 to provide naval officers stationed around the world with a method of completing their educational requirements (Stark, 1997). Many other educational institutions have created these types of programs as well. In the years following, videotapes and television

courses were the method of choice for distributing course instruction to those at distant locations. Now, videotapes and television are supplementing the Internet, two-way video, and audio communication links (Blumenstyk, 1997; Turtoff, 1995; Sedlak and Cartwright, 1997). To provide these new delivery methods, the public and private sectors are spending hundreds of millions of dollars to enhance their communications capabilities and computers available for distance education (Mojkowski, 1990; White, 1990).

Not all institutions, however, have embraced this new education practice. One study estimates that 55% of the 2,515 U.S. four-year colleges provide courses using distance education (Gubernick and Ebeling, 1997). Yale and Harvard have taken a "hands-off approach" to this new, nontraditional teaching method. Yale's representative argues that distance education does not meet its requirements for quality. The school is not sure the student will receive the same education provided to students attending classes in residence (Blumenstyk, 1997). Harvard's view is that the educational experience as a whole matters as much as the actual classroom instruction. The dorm life, camaraderie, and personal associations built during the college years are worth more than the convenience of pursuing an education through distance learning (Blumenstyk, 1997). Harvard's view of dorm life and other aspects of the college experience may be dated. In 1972, 28% of all college students were over 25. However, by 1994, 41% of the students were over 25. This is indicative of the target audience for distance learning (Gubernick and Ebeling, 1997). Consequently, the pedagogical approach may need to be different between the students in distance education courses and the students in on-campus courses.

However, some educators are concerned that distance education will, in the end, result in a reduced presence of teachers (Monaghan, 1996). One outcome of this direction is the idea of

stored courses. Stored courses are those created and stored in a virtual library for later use on the Internet or transmitted via microwave or television (Monaghan, 1996). The virtual library would be like a repository of modular portions of courses that could be tailored or grouped to form a specific course. These same educators wonder whether this will lead to students completing courses without contact with an instructor. This concept is termed "college in a box" (Monaghan, 1996:A23). There are also those that see the more interactive approach of the electronic classroom as an advantage over the more "passive" lecture style of the traditional classroom (Monaghan, 1996).

Today's focus on distance education concentrates on the use of computer technology. It stresses interactions between students and between students and the instructor through the use of computers (Sedlak and Cartwright, 1997). One reality for educational institutions is the resource cost of maintaining sufficient communication links and equipment to operate the courses transmitted on those links. The cost of conducting courses and transmitting them through satellites and other media is quite high. The plan from the perspective of the university should include an analysis of where it can get the most return from the investment in course and assessment development. If a class is seldom used or has few enrollees, the school may realize a net loss for the particular course. Consequently, schools should be selective in the courses they offer via distance education (Sedlak and Cartwright, 1997). At Duke University's Fuqua School of Business, students located as far away as Switzerland and Hong Kong are paying $82,500 for a four-year degree. The same on-campus degree costs $50,000. The differences in degree costs reflect the additional expenses of hotel accommodations and classroom fees at sites around the world (Gubernick and Ebeling, 1997).

A study identified several variables influencing the successful distance education student and the traditional student. Theses variables are motivation, tenacity, desirability, computer knowledge, availability of Internet capability, and self-discipline (Hiltz, 1995). During a three-year study, several interesting results were observed (Hiltz and Wellman, 1997). Students mastered the course work equally as well or better in the electronic classroom than in the traditional classroom. Students rated access to faculty and overall quality of the educational experience much higher in the electronic classroom. Students tended to classify the electronic classroom experience as group learning versus individual learning. As this tendency increases, the student is more likely to view the experience as superior to the traditional classroom (Hiltz and Wellman, 1997; Hiltz, 1995).

A study conducted at the New Jersey Institute of Technology used pre- and post-course questionnaires, direct observation, interviews with faculty and students, and grades from course work to make comparisons of distance education and traditional students by matching results from the same course taught as a traditional course and taught via distance education. Most students (71%) believed they had better access to faculty in the distance education courses versus the traditional classrooms. In addition, 73% of the students indicated the distance education course experience was more convenient than the traditional classroom (Hiltz and Wellman, 1997; Gillespie, 1997). At the University of Phoenix, all graduating students were given standardized tests. Students educated via distance education scored from 5% to 10% higher than those students educated in the traditional classroom (Gubernick and Ebeling, 1997).

On the down side, only 33% of the distance education students said they developed new friendships during the distance education courses while students in traditional classes were much more likely to develop friendships. Not surprisingly, 52% of the distance education students

reported the tendency to get busy with other things and fall behind in the course work. This last aspect is more prevalent in distance education than in the traditional classroom (Hiltz and Wellman, 1997).

Clearly, academic institutions are designing courses and entire curricula for students to complete outside of the traditional classroom. However, the students cannot normally complete the assessment the same way. A student will enroll and accomplish the course via distance education but when an assessment is required, the student must find someone to proctor the assessment. Many institutions, such as Pennsylvania State University, have extraordinary rules governing the occupation and function of a proctor (PSU, 1998).

Problem Statement

From a review of the literature, there are many accredited and respected educational universities offering distance education courses. Given this trend, the literature also reveals a significant majority of the same group of educational institutions avoid using nontraditional student assessment technologies, such as exams via the Internet. Institutions could be missing a viable and cost effective method of conducting assessments. Consequently, what specific issues are influencing an institution's decision to limit the type of student assessments and delivery methods?

Research Objective

The completed research will reveal the issues universities' representatives feel are important when deciding on the types of assessments and delivery methods. Additionally, an assessment selection model is developed and tested using the literature and the interviewing

process. The completed model is then used to provide insight into universities' assessment selection process.

Research Questions

Does the Assessment Selection Model (ASM) provide insights into the specific issues influencing an institution's decision on the type of student assessments and the acceptable delivery method?

Are there additional issues that institutions are considering that the ASM did not address?

What is the relative importance among the issues that institutions feel are significant?

Management Implications

Academic institutions should base the assessment selection decision on informed criteria. Fundamentally, a university's decision should be based on up-to-date information concerning technology, acceptable policies, student requirements, academic quality, and academic integrity. This research could serve as the impetus for institutions to re-evaluate their current assessments and the assessment selection process.

Summary

The following chapters provide additional information concerning this research effort. Chapter II provides the literature foundation of the Assessment Selection Model. Chapter III provides information on the research methodology used in the study. Chapter IV describes the data resulting from conducting the research as described in the methodology. Chapter V interprets the findings derived from the research and summarizes the thesis as a whole.

II. Literature Review

Introduction

In this chapter, the literature review identifies essential constructs to create a model that can then be used to reveal insights into an institution's assessment selection methodology. The literature concerning assessments covers a wide range of issues. However, the literature did not specifically address the issues institutions use to establish acceptable assessments and the associated delivery methods. Consequently, a model of the assessment selection process in universities does not currently exist. To alleviate this, the current study creates a model based on similar issues as discussed in the literature.

The literature focuses a great deal on methods to develop, validate, and use assessments. The material also discusses the positive and negative aspects of the various types of assessment questions including ways to improve assessments. Additionally, the literature review reveals research on the use of computers in the classroom. The research discusses computer usage as it benefits instruction or usage as a training tool as opposed to benefiting student assessments (Spencer, 1996; Crumb, 1990). The research also reflects faculty computer use as essentially automating current instruction methods and not affecting pedagogy.

Discussion of Literature

The following definition indicates the purpose of a well-developed assessment in a course. The definition describes the role of the assessment as a tool to provide benefits to the student and instructor in terms of learning and development and not simply for grades.

> Assessment is the process of defining, selecting, designing, collecting, analyzing, interpreting, and using information to increase students' learning and development. It includes discussions about what should be assessed and how information will be used, not just the hands-on testing of students. (Ratcliff, 1997:22)

The literature revealed many issues important to areas related to pedagogy, computers, cheating, and assessments. The particular issues discussed in this thesis were chosen for their potential usefulness in the development of an assessment selection model. Only through the forthcoming validity process can the usefulness of the issues be known. The issues extracted from the literature were grouped into five broad issues. The issues are: technology, administrative, inertia, security, and cost.

Technology issues are concerned with the technological capabilities available to the institution to deliver the assessment to the student. Administrative issues are those that address the faculty's time and efforts to create, maintain, deliver, and score an assessment. These issues also include all of the features required of an academically rigorous assessment. Inertia is the tendency of an institution to resist changes and maintain the status quo. It also encompass the institution's concern with enhancing or maintaining its academic reputation. Security issues are concerned with the institution providing a secure environment for the creation, storage, delivery, scoring, and execution of an assessment. The last issue, cost, addresses both the assessment costs and the costs required to provide the assessment to the students.

The issues listed in Table 1 are the terms uncovered during the research of the literature. The mapping of the issues to the constructs is as follows:

Table 1. Assessment Selection Model Issues

Constructs	Issues	Source
Technology Issues	Future use of a technology	Garcia and Ratcliff, 1997 Bicanich and others, 1997 Burgess, 1994 Spille and others, 1997
	Sufficient technical knowledge	Ellington and others, 1993 Farmer, 1997 Gillespie, 1997 Komives and Peterson, 1997 McDaniels, 1997 Engstrom, 1997 Bicanich and others, 1997
	Internet access AND Physical transmission of assessment	CUSE, 1997 Hansen, 1994 Kean, 1994 IDS, 1994 Bicanich and others, 1997 Garcia and Ratcliff, 1997
	Web-capable software	Garcia and Ratcliff, 1997 Gubernick and Ebeling, 1997
Administrative Issues	Faculty perception of computer-based testing	Stager and Mueller, 1991 Bicanich and others, 1997
	Assessment Development AND Ease of assessment maintenance AND Ease of assessment scoring	Stager and Mueller, 1991 Brigance and Hargis, 1993 CUSE, 1997 Wubbels and Girgus, 1997 Hansen, 1994
	Course material coverage	Brigance and Hargis, 1993 CUSE, 1997 Stager and Mueller, 1991
	Assessment Difficulty	CUSE, 1997 Cizek, 1997
	Delivery Methods	Bicanich and others, 1997
	Validity AND Reliability	Bicanich and others, 1997 Brigance and Hargis, 1993 Ellington, 1993 Jacobs and Chase, 1992
Inertia	Pedagogy changes	Stager and Mueller, 1991 GMAC, 1998 GRE, 1998 Hansen, 1994 Kean, 1994 Farmer, 1997

Inertia	Pedagogy changes (con't)	Mojkowski, 1990 White, 1990 Engstrom, 1997 Wubbels and Girgus, 1997 CUSE, 1997 Phye, 1997
	Reputation	Jacobi and others, 1987
	Strategic Vision	Jacobi and others, 1987 Doherty and others, 1997 Kean, 1994
	Academic rigor	Hansen, 1994 Doherty and others, 1997 Thomson and Morse, 1997
	Standards	Spencer, 1991 Hansen, 1994 CUSE, 1997 Kean, 1994
	Institution politics	Jacobi and others, 1987 Komives and Petersen, 1997 Gubernick and Ebeling, 1997
Security Issues	Security software and hardware configurations	Bicanich and others, 1997
	Password/restrict access	Bicanich and others, 1997
	Assessment security	Bicanich and others, 1997
	Physical environment	Gwinn and Beal, 1988 Bicanich and others, 1997
	Cheating	Aiken, 1991 Harpp and others, 1996 Barnett and Dalton, 1981 Bellezza and Bellezza, 1989 McCabe and Trevino, 1996 CUSE, 1997
Cost Issues	Delivery costs	Hansen, 1994 Farmer, 1997
	Hardware/software costs	Bicanich and others, 1997
	Assessment development and maintenance costs	Bicanich and others, 1997
	Costs to Implement Strategic Plan	Ferren, 1997

Technology Issues

Technology issues are concerned with the technological capabilities available to the institution to deliver the assessment to the student. Additionally, an institution must determine

what types of technology are appropriate, now and in the future, for the institution based on its mission, culture, and use (Garcia & Ratcliff, 1997).

Future Use of Technology. Current technological capabilities can provide solutions to the known assessment requirements of the faulty and staff. However, technology also enables changes to future, anticipated methods of accomplishing tasks. This analysis of current technology with a look to the future explores the paradigm that an institution uses to view the future use of technology. One might expect the advances in technology to provide the stimulus to shift paradigms to include an increase in electronic testing.

In order to accomplish the paradigm shift, the technology must complement the goals, mission, and student capabilities. This technology could include any hardware device or software required to accommodate the delivery. Today and continuing into the future, the Internet and web-capable sites can deliver course materials, e-mail, homework assignments, course instruction, student-to-student and student-to-instructor interaction, and assessments (Garcia and Ratcliff, 1997; Bicanich and others, 1997). However, virtually all institutions engaging in courses on the Internet have not ventured into conducting assessments using the same technology (Burgess, 1994; Spille and others, 1997).

Sufficient Technical Knowledge. Courses using newer technologies require greater technical knowledge from the faculty and staff to create, manage, and conduct the courses. Additionally, students require greater technical knowledge to satisfactorily participate and learn during the execution of the course. Unfortunately, the literature documents a huge gap in technical knowledge between the course providers and course participants (Komives and Peterson, 1997; Engstrom, 1997).

More and more faculty members are using new technologies to perform tasks such as e-mail, posting syllabi on the WWW, administrative information, and the like. Institutions are using these new technologies and capabilities to develop hundreds of undergraduate and graduate courses in the area of distance education. New capabilities such as multimedia technology provide innovative delivery methods of courses to students who are unable to take courses in the traditional way. In fact, this is the latest boon to distance learning (Ellington and others, 1993). Innovative methods of course delivery have enjoyed huge successes touting a higher percentage of students completing the course than the same course taught in the traditional classroom (Farmer, 1997; Gillespie, 1997). However, the course assessments are not completed in the same fashion.

Students entering today's institutions have a much higher level of computer literacy and technical knowledge than previous generations (Komives and Peterson, 1997). The National Assessment of Educational Progress (NAEP) compiled data from students in the graduating class of 1996 taking the SAT. They found that 72% of the students had experience with word processors on computers and over 50% were labeled as computer literate (McDaniels, 1997). Frequently, the students have a better understanding of computers and more knowledge of computing technology than the average faculty member (Engstrom, 1997). Consequently, students actively pursuing an academic education have sufficient technical knowledge to actively engage in electronic courses. However, each institution must evaluate its student population to determine the appropriate type of assessments and delivery methods (Farmer, 1997).

Several studies provided substantial evidence that students are much more active in the learning process when courses use computing technology. The students, through the use of

many activities, learn more by collaborating with peers (Engstrom, 1997). Contrasting with this benefit, a study conducted in 1996 indicated only 38% of faculty used e-mail in their courses. In addition, the faculty believed only 31% of their students knew how to use the World Wide Web (WWW) (Engstrom, 1997). This reflects a disconnect between the faculty's perceptions about students' abilities and students' actual technological capabilities.

To help satisfy technology requirements on campus, institutions have ambitious plans to dramatically improve campus infrastructures for high-speed telecommunications. Unfortunately, technical knowledge and abilities of the faculty have lagged seriously behind the technological advances (Komives and Peterson, 1997; Bicanich and others, 1997).

Internet Access and Physical Assessment Transmission. For courses using newer technologies, how to deliver materials becomes an issue. For an Internet-based course, Internet access by the faculty and staff of the institution is necessary to conducting the course. The students involved in the class must also have access to the same delivery method.

Consequently, in addition to technical knowledge, students may also require access to personal computers and the Internet to make the delivery of course material and assessment practical. Not only must institutions evaluate what methods of delivery provide the student with best chance of correctly demonstrating mastery of the course material, innovative assessments should also be considered (CUSE, 1997; Hansen, 1994). Methods of assessment include paper-based assessments, group projects, individual projects, and experiments. Each method has its own inherent advantages and disadvantages associated with the delivery method chosen by the institution (Kean, 1994; IDS, 1994).

Technology changes during the recent decade provided the opportunity to electronically transmit an assessment directly to the student (Bicanich and others, 1997). This transmission can

be interactive during the course of the assessment or the assessment can be transmitted in its entirety. Assessments can be transmitted as hypertext from a web page, e-mail, telnet, or accessed via a network (Garcia and Ratcliff, 1997). The institution should consider these new technological capabilities of assessment transmission when deciding the types of acceptable assessments and the delivery method.

Web-Capable Software. The World Wide Web is providing faculty members unparalleled flexibility in the distribution of materials. For the first time, a student can receive electronic versions of syllabi, assignments, lectures, notes, and assignments via web-capable software accessing the institution's web-site (Garcia and Ratcliff, 1997). However, most faculty members are not exploiting the capability but merely automating existing processes and information. The WWW has literally opened the institution's doors to students around the world. Now institutions are faced with decisions as to who the target population will be and how the potential students will be best served. Also, today's students are usually older than previous college students. These new students bring a different view of education and are typically more mature and motivated to learn (Gubernick and Ebeling, 1997).

Administrative Issues

Administrative issues are concerned with the faculty's time and efforts to create, maintain, deliver, and score an assessment. Administrative issues are applicable to any assessment whether paper or electronic and included such things as faculty perceptions of computer-based testing; ease of assessment development, maintenance, and scoring; coverage of material; assessment difficulty; efficiency of delivery methods; and validity and reliability of assessments.

Faculty Perception of Computer-Based Testing. Research indicates that faculty tend to equate computerized testing with training or practice exercises for students. They also tend to place machine or automated scoring of answer sheets in the category of computerized testing (Stager and Mueller, 1991). In addition, faculty, as a group, tends not to recognize the possibilities of true computerized testing. True computerized testing is such that the student accesses an assessment via a computer, local or distant, and completes the entire assessment. The assessment is scored by the software, returns a score to the student, and enters the information into an electronic database (Bicanich and others, 1997).

Assessment Development, Maintenance, and Scoring. Obviously, the choice of assessments has implications for the faculty in terms of what is required to create, maintain, and score the selected assessments. Electronic assessments, while requiring the effort to create and maintain a suitable set of instruments, can provide real advantages to the faculty.

Table 2 lists several potential benefits of computerized testing (Stager and Mueller, 1991). The original table was reduced to the relevant items for this research.

Table 2. Benefits of Computerized Testing

Automates the process of creating tests
Automates the process of scoring tests
Facilitates the creation of equivalent versions of the same exam
Provides access to existing test banks
Standardizes test administration procedures
Provides more detailed feedback to the student
Enables teachers to become classroom researchers
Provides analysis of the errors in strategies students are using

(From Stager and Mueller, 1991:248)

According to Stager and Mueller, institutions should evaluate each of these benefits based on the culture of that institution. There are software packages commercially available to provide all of the benefits listed in the table. More importantly, not only the faculty but students can benefit from computerized testing. In addition, software can automate the process of creating equivalent assessments. Equivalent exams are critical to ensure that each student receives an assessment equally as difficult as any other student. Producing assessments of equal difficulty is particularly important when randomly generating assessments (Stager and Mueller, 1997).

To enhance computer-based testing, some institutions have used test banks to house valid and reliable sets of assessment items. The test banks provide an automated method of controlling, updating, and using the available information. By automating the assessments, all of the students, whether they are the first class or tenth class, receive identical instructions. In traditional assessment delivery, groups of students can receive very different instructions. Also, faculty may inadvertently give one group an advantage by providing additional information (Stager and Mueller, 1991). For example, as the instructor administers the exam to successive classes, the instructions given to the students will change.

Research also suggests institutions should be interested in the requirements needed to create, maintain, and score the assessment (Bicanich and others, 1997). Computers are pervasive in institutions today and are normally used by faculty to automate the creation of assessments by using word processing packages. However, institutions have underutilized the potential benefits of automating the delivery of the assessments. Once the assessment is created, it is much easier to maintain the assessment in the electronic form than a traditional paper-based examination. Ease of scoring is also a primary consideration of faculty particularly when many students take

the examination (Brigance and Hargis, 1993; CUSE, 1997). When the student has completed the assessment, the software records all of the desired information concerning the assessment in a database.

Computers can also provide interactive assessments and can handle a far greater number of students. Whether using a multiple-choice, essay, or other forms of assessments, new technologies can assist the faculty in performing the evaluation of students (Wubbels and Girgus, 1997; Hansen, 1994). Ease of scoring can dramatically reduce the effort required by faculty while maintaining the ability to have direct knowledge of a specific student's performance (CUSE, 1997).

Course Material Coverage. All assessments, independent of type or delivery method, must provide adequate coverage of the course material. The curriculum content is derived first and then the assessment. The assessment should contain an adequate sample of the course material deemed important for mastery (Brigance and Hargis, 1993; CUSE, 1997). In addition, the assessment must be valid and reliable by clearly evaluating the correct course material at a difficulty level commensurate with the institution's policies.

Another administrative aspect for an assessment should be the timely measurement of student performance that allows feedback for the student. A goal of the assessment should be to gain insight into students' learning or curriculum deficiencies (Brigance and Hargis, 1993). One or more students may not be learning the material as desired and consequently the assessment should provide that information to the faculty. In addition, curriculum changes may be in order, but the faculty member may not realize this if assessments are simply used as part of the course grade.

To gain more insight into the student and course performance, conducting automated assessments allows faculty members to become classroom researchers (Stager and Mueller, 1991). Assessments can not only provide basic information such as scores, number right or wrong, but also in-depth information. For example, statistics such as which items were missed, frequency of items missed, and item distracters selected most often can readily be made available to the instructor. The statistics can provide useful information to the instructor. For example, knowing that a particular distracter is being selected at a high rate may indicate a flaw in course delivery (Stager and Mueller, 1991).

Finally, computerized testing can provide insight into a student's mistakes. For example, if the question were "What is 34 + 4?" If the student selected the distracter with 30 as the answer, this would seem to indicate the student mistakenly subtracted instead of added. If the student selected the distracter with 83 as the answer, the student might be inverting the number 38 (Stager and Mueller, 1991: 259). Consequently, a well-developed set of distracters written within the context of a question could have inherent course and student evaluation information.

Assessment Difficulty. Assessment difficulty refers to the ability of the assessment to determine the level of knowledge achieved by the student. The assessment is meant to provide the instructor with sufficient reassurance that the student did in fact learn the material. Electronic assessments should be sufficiently difficult to reach the level of domain coverage as required by the institution (Cizek, 1997).

Table 3 displays common assessment approaches as they relate to the achievement targets of the course. Within content acquisition, there are two subdivisions: select-type and supply-type formats. The essential difference is select-type is more indicative of recognition memory as opposed to supply-type requiring more recall memory. Procedural knowledge and performance

both require a great deal of recognition and recall memory (CUSE, 1997). These last two targets are gaining favor in institutions in the form of individual or group projects. Some institutions are assessing student's mastery through projects requiring the use of skills learned in the course and the student's own creativity.

Table 3. Taxonomy of Assessment Approaches

Achievement Targets	
Content Acquisition	Select-type formats (e.g., multiple choice, true/false, alternate choice, matching)
	Supply-type formats (e.g., short answer, fill in the blank, label a diagram)
Procedural Knowledge	Describe a process (e.g., lab experiment, operate a machine, construct a flowchart, direct observation, "show your work", "tell the steps you followed")
Performance	Demonstrations (e.g., build a birdhouse, repair a car, write an essay, debate an opponent, recite a poem, compose a song, lead a discussion, compete in an event, create a sculpture)

(Cizek, 1997:22)

Delivery Methods. Similar to traditional assessments, electronic assessments must be understandable in that the student must not get lost in the technology of the assessment delivery. An electronic assessment requires clarity when soliciting a response from a student. Some faculty are concerned that the electronic delivery of assessments is inherently inferior to paper-based assessments. However, at least one study found Internet-delivered and paper-based assessments to be equivalent using the test-retest design (Bicanich and others, 1997).

Validity and Reliability. An assessment that measures what it was developed to measure has high validity. One study indicates the key to Internet testing is having high test validity (Bicanich and others, 1997). An important type of validity is content validity. An assessment with high content validity confirms that the instructor is indeed measuring the course material the

student received during the course. Consequently, researchers argue that the assessment should be explicitly derived from the important portions of the course and cover the domain of knowledge for the course (Brigance and Hargis, 1993; Ellington, 1993; Jacobs and Chase, 1992).

Assessments providing consistent results from repeated administrations to the same or similar groups have high reliability (Ellington, 1993; Jacobs and Chase, 1992). There are three major types of assessment reliability: test-retest reliability, internal reliability, and interrater reliability (Brigance and Hargis, 1993:65). Test-retest reliability is concerned with correlating the scores on several iterations of the assessment to ensure the instrument yields similar results. Internal reliability is concerned with having an assessment where all of the items are at the same level of difficulty and are measuring the same domain of knowledge. Interrater reliability is a reflection of the ability of the instrument to produce similar results from different evaluators. Each of these types of reliability is critical for electronic assessments. For example, a randomly generated, multiple-choice assessment would be reliable if the software is constructed to ensure that each randomly generated examination is equivalent and repeated executions yield similar results.

Inertia

Inertia, as used in this study, is the tendency of an institution to resist changes and maintain the status quo. This issue also encompasses the institution's concern with enhancing or maintaining its academic reputation. This research focuses on the resistance to using new technology and to providing electronic assessments. For example, Dr. Updogrove of Yale University indicated many of Yale's professors doubt distance education courses can meet the "quality dimensions that make Yale comfortable" (Blumenstyk, 1997). Additionally, James

Aisner of Harvard Business School indicates Harvard also has a tendency to resistance change. Mr. Aisner says that distance education "goes against what Harvard stands for in terms of the learning process" (Gubernick and Ebeling, 1997). Seen in this light, inertia can be a stabilizing influence, one that protects the quality and heritage of an institution. On the other hand, inertia can manifest itself in such things as resistance to pedagogy changes, over sensitivity to perceived reputation, a lack of strategic vision about the future of developing and using assessments, as well as concerns about maintaining academic rigor and standards.

Pedagogy Changes. Institutions in the academic arena tend to move slowly when facing changes to the curriculum (Stager and Mueller, 1991; Mojkowski, 1990). The faculty typically resists efforts to introduce pedagogical changes whether these changes originate from the institution's leadership or from new technological capabilities.

Stager and Mueller argue that education professionals believe that computerized testing is inferior to paper-based testing. They list eight criticisms of computerized testing. Table 4 lists the six criticisms that are applicable to this research.

Table 4. Criticisms of Computerized Testing

Is expensive
Produces lower student achievement
Is limited to assessing information recall and recognition
Separates the student evaluation process from instruction
Increases student anxiety about the testing process
Removes the teacher from the evaluation process

(From Stager and Mueller, 1991:260)

Although when Stager and Mueller wrote this article, computing technology was more expensive, institutions have since spent millions of dollars to provide sufficient computing and communication capabilities for activities other than for assessments. Consequently, the

additional cost of computerized testing would be relatively inexpensive (Bicanich and others, 1997).

Similarly, research had shown that students performed equally as well between paper-based and computerized assessments. However, a form of computerized testing known as adaptive testing caused suspicion in the minds of some (Morrow, 1997). The GRE and GMAT are assessments that use this methodology (GMAC, 1998; GRE, 1998). This form of assessment determines the next question based on the student's performance on previous questions. Not all computerized assessments use the adaptive style of testing.

Another criticism is that faculty perceives computer-based testing is limited to testing recall or recognition memory. Research has shown that this is a problem with assessments as a whole and is not limited to computerized testing. Research shows that 80% of all paper-based assessments are limited to testing recall or recognition memory (Stager and Mueller, 1991).

The criticism that students feel anxiety when taking a test on a computer is simply not substantiated by research. At one institution 97% of the students reported that they liked computerized tests "a lot" and at a second institution 68% of the students preferred computerized tests (Stager and Mueller, 1991).

The criticism that faculty members may become detached from the assessment process has some merit. Some faculty members indicated that they like the interaction of delivering an assessment and then personally grading the assessment in order to make a better evaluation of a student's abilities (Hansen, 1994; Kean, 1994).

Besides being critical of computerized testing, many faculty members have been slow to use technology to improve pedagogy. In many institutions today, faculty have Internet access directly from their desk computers. Typically, this access to the Internet does not result in the

faculty incorporating this capability into curricula (Farmer, 1997). One reason for the failure to incorporate the Internet into curricula is that computer technology is advancing much more quickly than academic institutions can update their pedagogy. Charles Mojkowski posed the following three questions for institutions to evaluate concerning new technology and the educational process (Mojkowski, 1990:13):

> 1. How should existing curriculum and pedagogy be redesigned to accommodate and maximize the use of the technology?
>
> 2. What are the most appropriate ways to bring technology into the curriculum?
>
> 3. How can computers and other new technological tools be used as catalysts to revitalize existing curriculum and instruction within and across subject areas?

Mojkowski's perspective is that technology is not providing the motivation or capability to provide improvements to educational curricula but is simply being used to automate existing processes. Institutions are spending millions of dollars annually on computer technology without regard to the improvements in pedagogy this technology can provide (Mojkowski, 1990; White, 1990). However, the research revealed that many institutions have adopted new computing technologies to deliver distance education courses. Some institutions are using the Internet to deliver many courses in an asynchronous fashion and charging a premium for that service. Many of the same institutions also require paper-based examinations for the courses as opposed to using an assessment commensurate with the course delivery method. Others, such as Duke University's distance education program, use group projects as a method of student assessment. For an Internet course, for example, the assessment might be a web-based, electronic project.

Stager and Mueller state the reason computer technology has not been incorporated into education pedagogy is training for faculty tends to focus on computer literacy, using computers

to expedite personal productivity, and the actual mechanics of computing (Stager and Mueller, 1991). In addition, instructors tend to teach in a method similar to the way they were taught which was without computers (Stager and Mueller, 1997). However, using computers to enhance productivity does not necessarily create pedagogical changes. When it does not, then technology is not being used to the maximum extent possible (Engstrom, 1997). Therefore, a pedagogical change must occur from within the institution to produce support for a paradigm change that includes conducting assessments commensurate with the delivery method of the course. The pedagogical change will require a shift in the institution's inertia before the actual change can occur, but the change will necessitate sufficient knowledge of the technology and the willingness to use it.

Computers offer new and potentially valuable methods of delivering the assessment to students. This area offers institutions the opportunity to address the "underdeveloped pedagogy" of electronic examinations (Wubbels and Girgus, 1997:280). Additionally, computers can provide interactive assessments and can handle a far greater number of students. Whether using a multiple-choice, essay, or other forms of assessments, new technologies can assist the faculty in performing the assessment evaluation of students (CUSE, 1997).

In 1990, a cooperative venture between the American Federation of Teachers, the National Council on Measurement in Education, and the National Education Association developed a set of essential standards for faculty competence in educational assessments. The standards were intended to provide guidance in the training of educators, accreditation of preparation programs, and the certification of future educators. The minimum standards of faculty members are shown in Table 5.

Table 5. Faculty Member Assessment Knowledge Standards

Skilled in choosing assessment types
Skilled in developing assessments
Skilled in administering, scoring, and interpreting results
Skilled in using assessment results when making decisions
Skilled in developing valid student grading procedures that Use student assessments
Skilled in communicating results to students, parents, others
Skilled in recognizing unethical, illegal, and other inappropriate Assessment methods and uses of assessment information

(Phye, 1997:36)

Reputation. The literature suggests that all institutions are sensitive to their perceived academic reputations. The literature does not specifically mention assessments as contributing to or detracting from an institution's reputation, but it is implied nonetheless. Jacobi discusses two common approaches to define academic excellence: reputation and resource. Reputation is equated to the institution's perceived excellence and prestige in the academic world. Resource relates to comparisons based on criteria such as faculty productivity, endowments, or assessment scores. The results from the two approaches tend to reinforce one another. An increase in reputation can increase resources and likewise an increase in resources can increase the reputation (Jacobi and others, 1987).

Strategic Vision. The literature supports the notion that all assessments should be used for more than simply arriving at grades for students. Assessments should be developed to provide insight into whether goals and objectives are being met (Jacobi and others, 1987). Although some of the literature focuses on institution-wide assessments, each faculty member should incorporate the course goals and objectives into each course assessment. Consequently, institutions should have a strategic perspective in evaluating future forms of assessments.

Institutions should address early in the course development process what the appropriate course material and the corresponding assessment will be for each course. Entrance and exit criteria must be clearly matched to the goals and desired behavior of the students. Therefore, assessments should meet the institution's standards, which in turn are carefully chosen to reflect the goals the institution is striving to achieve (Doherty and others, 1997). The issue of standards relates directly to the institution's strategic goal for the overall institution. If an institution has a long-term goal to increase academic standards, one issue requiring attention is the acceptable form of assessment (Jacobi and others, 1987; Kean, 1994).

Academic Rigor. Assessments should be of sufficient academic rigor to ensure the course material was in fact learned by the student (Hansen, 1994). Also, assessments should be accomplished in a manner similar to how the student will use the information (Doherty and others, 1997). For example, collaborative learning is used extensively in subject areas where the student will, upon graduation, use the information in a team-oriented process. Institutions also use assessments to enhance their reputation and standing among their peers. Schools that are among the most academically stringent are also among the highest ranked academic institutions (Thompson and Morse, 1997).

Standards. All academic assessments, of any form, are normally of two types: criterion-referenced and norm-referenced (Spencer, 1991; Hansen, 1994; CUSE, 1997). Criterion-referenced assessments judge a student's performance against an established standard. The standard is determined for a course prior to the execution of the assessment. Criterion-referenced assessments also have minimum acceptable performance standards inherent in the assessment. A student will simply meet or fail to meet the standard for the assessment. Norm-

referenced assessments judge the students in relation to each other. Students' success or failure is not related to a minimum acceptable standard. Either type can be applied to electronic assessments. However, the assessment must be consistent with institution standards (Kean, 1994).

Institutional Politics. Institutions are not immune to the phenomena of inertia. Inertia can exhibit itself by the reluctance to affect pedagogy changes, long-term direction, or future actions unless highly encouraged to do so. In fact, institutional politics can be such that research outcomes advocating a change in policy or program will be criticized based on research methodology as opposed to the findings themselves (Jacobi and others, 1987). The following quote exemplifies this attitude:

> Further, many post secondary institutions are highly conservative and faculty or administrators may be vested in maintaining status quo. Under such circumstances, resistance is mobilized when change is recommended, and information about outcomes may become a victim of academic gamesmanship. (Jacobi and others, 1987:11)

One institution created workshops to help the faculty learn how to change the focus from teaching to student learning. The faculty resisted this effort and asserted that the new focus violated their academic freedom to conduct courses in the manner they saw fit. Also, the faculty indicated the changes placed too much attention on students and reduced the faculty's role as the center of the learning process (Komives and Petersen, 1997; Gubernick and Ebeling, 1997).

Security Issues

Security issues are concerned with the institution's ability to provide a safe and secure environment for the creation, storage, delivery, and scoring of an assessment. Security issues

include such things as configuration of software and hardware to enforce security; access controls; and use of proctors to minimize cheating.

Security Software and Hardware Configurations. Many software products and hardware configurations are available for the institution to effectively secure electronic assessments. Most institutions have, at a minimum, rudimentary implementations of these capabilities currently in place. They may simply need to enhance these capabilities to ensure a level of security commensurate with the standards the institution is determined to achieve (Bicanich and others, 1997).

Password/Restrict Access. Obviously, assessments require protection from unauthorized access. Access controls must be sufficient to allow only legitimate students enrolled in the course to gain access to the assessment. Several methods exist to help ensure that access control is maintained. The most basic and relatively effective method is to restrict access by assigning each student a unique login and password (Bicanich and others, 1997). This method places the security of students' logins and passwords in the students' hands to prevent compromise.

Assessment Security. Assessment software is also available to provide additional security by allowing the test to be taken only during certain hours, limiting the number of times the student can access the assessment, accurately recording answers, etc. In addition, many operating systems provide extensive tracking of logins and recording of system activities related to that login (Bicanich and others, 1997).

Physical Environment. One institution conducted an experiment in 1988 using an older mainframe computer with terminals housed within a single room. The students were allowed to

take the required assessments at their convenience during a predetermined period of time. There were two noteworthy comments pertaining to the research. First, the students believed the amount of cheating was equal to other tests but they perceived additional opportunities to cheat. Secondly, following the course, 70% of the students preferred the computer tests to paper-based tests (Gwinn and Beal, 1988). A more recent study found 68.5% of the 360 participating high school students had little to no prior Internet experience. Nevertheless, the students favored the web-based, electronic assessment by a 3-to-1 margin over the paper-based equivalent assessment (Bicanich and others, 1997).

Cheating. Another area of concern in the administrative realm in education today is the use of proctors as the best safeguard against possible cheating by a student. The literature exemplifies this idea by the following quote: "Everyone knows that some students cheat, and some believe that everyone cheats some time" (Aiken, 1991: 726). Aiken suggests increasing the number of proctors as the best way to prevent cheating. According to a different study in 1981, 48% of college faculty members believed proctors watch examinees consistently. However, only 21% of the students agreed (Barnett and Dalton, 1981). In addition, there are software packages available that could reduce cheating without increasing the number of proctors. Such software uses statistical modeling to establish the probabilities of two students answering exactly the same questions on the test. For example, if one student missed the same questions as another student and they both missed them by selecting the same distracters, the software will establish the probability that this could occur (Aiken, 1991).

Traditional measures have centered on preventing cheating as opposed to trying to catch cheating after the fact (Aiken, 1991). Methods include multiple exams, random seating arrangement, placing empty seats between students, and, of course, multiple proctors. One study

cited by Aiken found exams with rearranged questions and answers effectively eliminated detectable cheating (Aiken, 1991). A supporting study found scrambling the exams and/or the seating arrangement virtually eliminated cheating (Harpp and others, 1996). One study found that the larger the portion of students living on campus, the less likelihood the students would cheat (McCabe and Trevino, 1996). In a study using electronic assessments, cheating was reduced an estimated four fold by informing the students that software would be used to analyze their answers to detect cheating (Bellezza and Bellezza, 1989).

Other ways to minimize cheating include using randomly generated assessments so that no two students receive the same items and creating the assessment such that it does not contain items requiring simple look-ups in the textbook (CUSE, 1997).

Cost Issues

An institution should consider the costs associated with the assessment and the facets required to provide the assessment to the students (Hansen, 1994). Equipment required to conduct various types of assessments could be vastly different. Consider the differences between conducting a simple paper-based, multiple-choice assessment and implementing a randomly generated, multiple-choice assessment delivered via the Internet. The technology and knowledge required to undertake either type should be a factor considered by the institution (Engstrom, 1997). Assessment costs includes such things as delivery costs, hardware and software costs, and assessment development and maintenance costs.

Delivery Costs. Assessment delivery costs for the selected assessment can be minimal or expensive (Farmer, 1997). For example, a paper-based assessment delivered during a class period by the instructor has virtually no delivery costs. On the other end of the spectrum, a web-

based, electronic assessment delivered via the Internet has much higher costs associated with the delivery method. However, after the initial installation of the computing and communications capabilities, the delivery cost of each subsequent assessment is virtually zero.

For paper-based exams in distance education courses, there are substantial postage and handling costs. There are time and salary considerations for the staff to prepare the exam for mailing and the receipt of the completed exam. Another consideration is the cost associated with providing a proctor.

Hardware and Software Costs. The costs for computing hardware and software to house, deliver, score, and store results for the assessment also need to be considered. Additionally, an institution may require higher quality communications capabilities to deliver this type of assessment. If the hardware and software are purchased specifically for the assessment effort, then the costs are higher. However, today's institutions have extensive computing capabilities and most likely will simply purchase the software required to properly process the assessment, thus lowering the direct costs attributed to a specific assessment (Bicanich and others, 1997).

Assessment Development and Maintenance Costs. Assessment development costs add a further dimension when considering the various forms an assessment can take. Costs for developing an assessment also reflect a range depending on the selected type of assessment. The faculty with a limited expenditure of effort normally accomplishes paper-based, traditional assessments. Routinely, a word processor is used to develop several assessments and each is used alternatively over time. However, one must also include assessment maintenance and scoring costs in with the development costs. Some assessments require more time to score than do others. The obvious comparison is between the multiple-choice and essay assessments.

Assessment maintenance is the act of updating the assessment to reflect changes in the material or focus of the course. For an automated examination, the process is similar. However, special software is required. In addition, any software required to score the assessment and then store the results incurs costs. In a study conducted among Pennsylvania high schools, software required to create, disseminate, score, and store results had a break-even point at 375 students (Bicanich and others, 1997).

Assessment Selection Model (ASM)

Th ASM was constructed by this researcher based on the preceding review of the literature and to help organize thinking around these issues. This model provides a foundation for identifying the issues that universities find germane to the assessment selection process. Additionally, this model demonstrates the issues' relative influence upon a university's assessment selection tendencies.

The Assessment Selection Model is comprised of five factors: technology, cost, security, administration, and inertia. Inertia is central to the model in that the remaining constructs interact individually and collectively either with or against inertia. In other words, inertia is the institution's resistance to change, but the other constructs cause a decrease or increase in that inertia to prevent or allow the movement toward a different assessment. Table 1 at the beginning of this chapter reveals how the individual issues aligned with their respective factors.

The individual issues are the terms that are expected to be used by institutions as they describe the factors that they considered in the assessment selection process. The ASM can then be used to classify the responses according to the mapping scheme. Figure 1 pictorially represents the relationships.

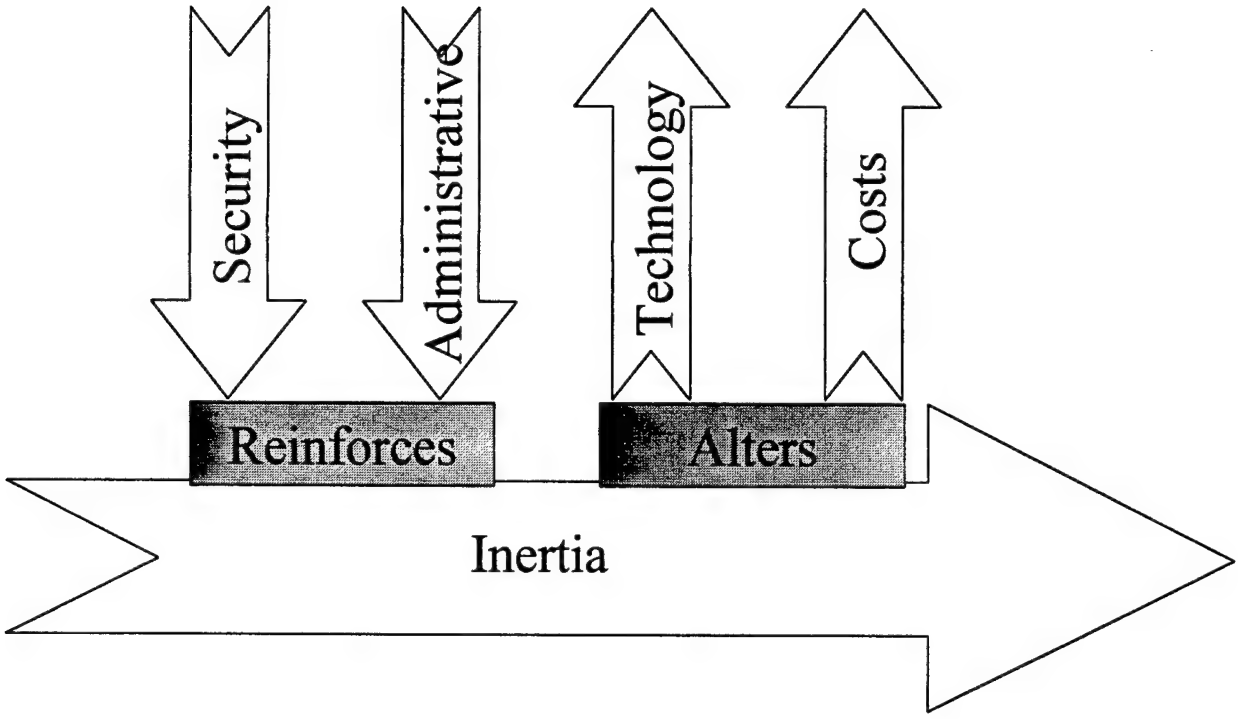

Figure 1. Assessment Selection Model

The Assessment Selection Model represents the institution's inertia as the current state of institutional assessment practices. This is the tendency to do things as they always have been done. Administrative and security issues will likely reinforce the institution's inertia. The faculty has a preferred method of developing, conducting, and scoring assessments and does not desire to deviate from that course. Security will tend to reinforce the status quo because the current level of security and level of threat are known, understood, and minimized in the faculty's mind. New assessments may create unknown threats or require activities not currently performed. Based on this, the inertia of the institution will remain with the current form of assessments.

Costs and technology, with sufficient force, do not reinforce but alter inertia. Increasing costs of current practices may tend to reduce the use of current assessments particularly if new technologies offer opportunities to do assessments for less. If costs become prohibitively expensive, an institution will most likely alter the status quo. Reductions in support staff or faculty could require a streamlining effort to move the institution toward technology enablers. Automated assessments have lower long-term manpower requirements for maintenance and distribution and might therefore, provide an alternative previously not desired.

Research Propositions

In order to address the research questions, five research propositions are developed below:

Proposition 1

Security initiatives and capabilities can provide a known, safe environment for the creation, storage, delivery, and scoring of an assessment. Frequently, the institution's standards and reputation will drive the level of security desired by that institution (Bicanich and others, 1997). Access controls used to ensure only authorized students are allowed to gain access to the assessment are normally implemented with a unique login and password (Bicanich and others, 1997).

Another area of concern in education is the possibility of student cheating. Security measures must be in-place to ensure the institution's standards of conduct are achieved. There are many software packages available using statistical modeling to establish the probabilities of two students answering exactly the same questions on an exam. In a study using electronic assessments, cheating was reduced four fold by simply informing the students that software would be used to analyze their answers to detect cheating (Bellezza and Bellezza, 1989).

Possibly, the use of a new technology is unsettling and the technology providing this capability to detect cheating is too new and unproven to establish academic confidence. Institutions' inertia may avoid assessment methods they perceive will detract from their academic reputations. Consequently, proposition 1:

> **P1:** Security issues create a level of comfort with the existing assessments and will reinforce the institution's current form of assessments.

Proposition 2

Institutions are concerned with the many administrative issues related to an assessment. The issues can apply to an electronic or a paper-based assessment and include items such as the faculty's time and efforts to create, maintain, deliver, and score an assessment.

Faculty equate computerized testing with training or practice exercises for students and place machine or automated scoring of answer sheets in the category of computerized testing (Stager and Mueller, 1991). Unfortunately, faculty, as a group, still do not accept the benefit of true computerized testing but tend to be critical of it (Bicanich and others, 1997). Therefore, proposition 2:

> **P2:** Faculty members and the institution's leadership perceive that the administrative requirements of computer-based assessments are greater than those of current assessments and this will reinforce the institution's current form of assessments.

Proposition 3

Technology issues are a major concern in educational institutions today. An institution must determine what types of technology are appropriate, now and in the future, based on its mission and culture (Garcia and Ratcliff, 1997). To accomplish this, the technology must complement the institution's goals, mission, and its student population. Today, the Internet and

web-capable sites can deliver course materials, e-mail, homework assignments, course instruction, student-to-student and student-to-instructor interaction, and assessments (Garcia and Ratcliff, 1997; Bicanich and others, 1997). However, few institutions conducting courses on the Internet have ventured into conducting assessments using the same technology (Burgess, 1994; Spille and others, 1997).

Students entering universities have a higher level of computer literacy and technical knowledge than previous students (Komives and Peterson, 1997). Frequently, the students have a better understanding of computers and more knowledge of computing technology than the average faculty member (Engstrom, 1997). Consequently, students actively pursuing an academic education could have sufficient technical knowledge to actively engage in electronic courses. A study conducted in 1996 indicated only 38% of faculty used e-mail in their courses. In addition, the faculty indicated they believed only 31% of their students knew how to use the World Wide Web (Engstrom, 1997). This data reflects a disconnect between students' actual technology capabilities and the faculty's perceptions about the students' abilities.

To help satisfy technology requirements on campus, institutions have been moving on ambitious plans to have campus infrastructures fully capable of high-speed computing. Unfortunately, technical knowledge and abilities of the faculty have seriously lagged behind the technological advances (Komives and Peterson, 1997; Bicanich and others, 1997).

Because institutions must evaluate what methods of delivery provide the student with the best opportunity of correctly demonstrating mastery of the course material, innovative assessments should be considered (CUSE, 1997; Hansen, 1994). However, frequently traditional assessment methods are used. Consequently, proposition 3:

P3: New technology provides an unknown and unproven capability to the institution, but as the technology becomes more prevalent, an institution may alter the types of assessments such that newer technology will be utilized.

Proposition 4

Cost issues are a significant concern to universities, particularly to distance education programs. Costs of creating, maintaining, and scoring the assessment are increasing. These costs include the faculty's time and effort to develop the assessment. Consequently, an institution should consider the costs associated with a particular assessment and its respective delivery method (Hansen, 1994).

One cost that affects institutions is the delivery cost for the selected assessment (Farmer, 1997). For example, a paper-based assessment delivered during a class period by the faculty has virtually no delivery costs. In distance education courses, delivering a paper-based assessment via the mail system has preparation, postage, and reception costs. An electronic assessment delivered via the Internet could have much higher costs associated with the delivery method. However, after the initial installation of the communication and computing capabilities, the delivery cost of each subsequent assessment is reduced to virtually zero.

The computing hardware and software to house, deliver, score, and store results for the assessment incur costs. If this hardware and software are purchased specifically for the assessment effort, then the costs are higher. However, today's institutions have extensive computing capabilities and most likely will simply purchase the software required to properly process the assessment, thus lowering the direct costs attributed to a specific assessment (Bicanich and others, 1997).

Actual assessment costs add a further dimension when considering the various forms of the assessment. Costs for the assessment also reflect a range depending on the selected type of assessment. Some assessments require more time to score than do others. One comparison is between the multiple-choice and essay assessments. In a study conducted among Pennsylvania high schools, software required to create, disseminate, score, and record results had a break-even point at 375 students (Bicanich and others, 1997). Therefore, proposition 4:

> **P4:** Current assessments have known costs and are likely to be favored unless costs of an alternate assessment are sufficiently lower to alter the affordability and desirability of the current assessment.

Proposition 5

Inertia can manifest itself as the tendency for an institution to resist pedagogy changes and maintain the status quo. Some education professionals firmly believe electronic testing is inferior to paper-based testing. These educators believe electronic testing is expensive, produces lower student achievement, is limited to assessing information recall and recognition, separates the student evaluation process from instruction, increases student anxiety about the testing process, and removes the teacher from the evaluation process. Educational research has cast doubt on all these criticisms, but educators still persist in avoiding computer-based testing (Mojkowski, 1990; White, 1990; Bicanich and others, 1997; Stager and Mueller, 1991; Hansen, 1994; Kean, 1994).

Computers offer new and potentially valuable methods of delivering the assessment to students. This area offers institutions the opportunity to address the underdeveloped pedagogy of electronic examinations (Wubbels and Girgus, 1997). Additionally, computers can provide interactive assessments and can handle a far greater number of students. Whether using a

multiple-choice, essay, or other forms of assessments, new technologies can assist the faculty in performing the assessment evaluation of students (CUSE, 1997).

In addition, institution politics can be such that research outcomes advocating a change in policy or program will be criticized based on research methodology as opposed to the findings themselves (Jacobi and others, 1987). Consequently, proposition 5:

> **P5:** Inertia in an institution will reinforce the current assessments used within the institution and will not alter from this course unless technology or cost issues provide sufficient motivation to do so.

Summary

As the literature review demonstrated, institutional assessments can be difficult to change. For the development of the Assessment Selection Model (ASM), inertia is used to demonstrate the tendency of institutions to resist change. Change is seen by some as an implication that something is wrong or deficient in the current methodology. In the area of assessments, it is possible that technology has produced the ability to enhance the assessment process as opposed to correcting a deficiency. The remaining four constructs in the model are cost issues, administrative issues, security issues, and technology issues.

These four constructs apply pressure on the institution's inertia. The more that high assessment costs become an issue, the more likely the institution will be to change assessments. For example, in distance education, it may be less expensive to e-mail an assessment to a student as opposed to mailing a paper examination.

Administrative issues include the tasks associated with creating, maintaining, scoring, and storing the results in the database. For courses with many students, the administrative costs per assessment can go down using advanced computing technologies. The more courses that utilize this technology the less cost is directly traced and amortized to a specific assessment.

Security issues are of paramount concern for institutions. Academic standards and reputation depend on quality assessments executed in a professional and secure manner (Kean, 1994). Electronic assessments can also provide a high level of security protection for the institution. But, for an institution to break free of the inertia, the proof of this protection will need to be significant.

Finally, new technologies enable electronic assessments to be practical. As these technologies become more prevalent and well known, institutions may feel more comfortable with them. Then, and probably only then, will some institutions feel secure in performing electronic assessments.

The next chapter of the thesis details the methodology for validating the model and the plan for gathering the data. The chapter also details how the target population was selected and references the interview questions asked to the respondents.

III. Methodology

Introduction

This chapter describes the overall methodology used to conduct the research. It describes the process of identifying and selecting the target sample population, conducting the initial validation of the Assessment Selection Model (ASM), and testing the model.

Research Design and Implementation

Overview

This is an exploratory study primarily because a review of the literature has not disclosed previous research in this area. Consequently, the current research uses existing research findings to develop a potentially useful model for describing the behavior of academic institutions concerning assessment selection decisions. Five specific propositions were then developed based on this model. The study then collected descriptive data to evaluate the propositions. The results of these propositions were used, in turn, to evaluate the Assessment Selection Model.

Interview questions, located at Appendix A, were developed to query the selected institutions as to possible issues effecting their choice of student assessments. A telephone interviewing technique was employed to provide the data. This technique produces rich data that is appropriate for this type of study. The targeted subjects of the instrument were selected from a list of accredited academic institutions that conduct distance education courses (Burgess, 1994; Spille and others, 1997).

Characteristics of Qualitative Research

Qualitative research is a form of research design to make sense out of some phenomenon, while disrupting the environment as little as possible. Qualitative research uses inductive reasoning to provide plausible explanations of the events. The following paragraphs list five characteristics of qualitative research (Merriam, 1998; Schmitt and Klimoski, 1991).

The first characteristic of qualitative research is its concern for individuals and their interactions with their environment. The qualitative researcher is interested in the ways individuals make sense of their environment. This study is interested in revealing the logical decision making processes used to select assessments.

The second characteristic of qualitative research is an interactive method of collecting data and conducting the data analysis. The interaction with the subjects of the research can be more personal and dynamic than with computers or questionnaires.

The third characteristic is that qualitative research normally requires that the researcher and subject be physically co-located. In this study, co-location is not possible. To alleviate this requirement, a telephone interview approach is used.

The fourth characteristic is that qualitative research primarily focuses on building concepts or theories rather than testing them. That is also true of this study. Since there are currently no models addressing this issue, this research builds and explores such a model.

Finally, the qualitative study is based on rich data derived from the sample population as compared to the hard numbers generated by the quantitative researcher. Each of the characteristics of the qualitative research is indicative of the present study. Therefore, a qualitative study is the appropriate form of research to answer the research questions.

Major Types of Qualitative Research

There are essentially five basic types of research in the area of qualitative research in education. Table 6 provides the five types and their respective characteristics:

Table 6. Types of Qualitative Research

Type	Characteristics
Basic or generic	- Includes description, interpretation, and understanding - Identifies recurrent patterns in the form of themes or categories - May delineate a process
Ethnography	- Focuses on society and culture - Uncovers and describes beliefs, values, and attitudes that structure behavior of a group
Phenomenology	- Is concerned with essence or basic structure of a phenomenon - Uses data that are the participant's and the investigator's firsthand experience of the phenomenon
Grounded Theory	- Is designed to inductively build a substantive theory regarding some aspect of practice - Is "grounded" in the real world
Case Study	- Is intensive, holistic description and analysis of a single unit or bounded system - Can be combined with any other of the above types

(Merriam, 1998:12)

The basic or generic qualitative study is representative of the current study. This form tries to uncover the process or understand the phenomenon being studied. The study draws information from other research to build a foundation of knowledge about the subject. The researcher using interviews or observations collects additional data. Then the data is analyzed for patterns.

Construct Validation

An initial assessment selection model was developed from the literature. Through meetings with the author's thesis committee, modifications were made to more clearly represent the constructs involved.

Two groups of three graduate students validated the revised model constructs. The first group, validated the revised list of constructs and issues. Each student was given the constructs and a description of each construct. In addition, the student was given the individual issues that tied to the constructs. The students mapped the specific issues to constructs based on the definitions provided with the constructs. The individual issues were the responses institutional representatives are expected to use as the issues affecting their decision making process. The aggregated issues were categorized into the constructs. As a result of this validation effort, changes were made to the model.

The group indicated several ambiguities in construct descriptions and several overlapping issues initiating unnecessary confusion. Consequently, nine issues were moved to other constructs that provided more logical mapping. Also, six issues were deleted due to overlapping coverage. Two issues were added to provide clarity in exactly what the issues was concerned with and nine issues were renamed to provide a more descriptive and clearer concept of the issue.

The second group was also given the construct and the individual issues from the newly revised model. This iteration found a logical and agreeable mapping between the constructs and issues. The complete issues and constructs used for the model are located in Table 1 in Chapter II. The completed model is located in Figure 1 in Chapter II.

Next, interview questions were created to extract the assessment selection behavior of the chosen institutions. A pre-test of the interview questions was completed with a local college representative.

Sample Population

This study's target population was derived from listings in two books. The first book, External Degrees in the Information Age, lists 140 institutions conducting distance education courses. The second book, The Oryx Guide to Distance Learning: A Comprehensive Listing of Electronic and Other Media-Assisted Courses lists 298 institutions offering some form of distance education.

The delivery methods of the 438 institutions included audiocassette, audio conferencing, audiographic conferencing, broadcast television, computer conferencing, electronic mail, interactive audio/video, online services, radio broadcast, satellite network, telephone contact, or videocassette.

Described below are the reduction criteria used to select the institutions comprising the study's sample population. First, the institution must have utilized some form of electronic course format. Many of the institutions listed in the books offered only videocassette or television courses. These types of institutions were omitted from the sample because they are not a typical representation of the population of interest. Only schools offering at least one electronic course would likely provide insight into the research questions.

Second, all of the institutions selected for the sample population must be four-year institutions accredited by a reputable academic accreditation organization. Because a goal of the study is to provide generalizability to the general academic population, the sample population must reflect the population of interest.

Finally, the selected institutions' representatives must have shown the willingness to participate in the research. The issue of participation can cause slight concern for reliability since the institutions' representatives that responded might not provide the ability to generalize. However, for an exploratory study, this was deemed to be an acceptable limitation. The chosen institutions for the sample population are listed at Appendix B. The interview sample was selected using a random number cycling through the sample list, at Appendix B, until 20 participating universities were interviewed. The identities of the participating universities were intentionally excluded to prevent a reader from correlating specific comments to a particular university.

Interviewing

Frequently, interviews are required when behavior is not available to be observed. This could occur when studying past events or when it is not possible for the researcher to observe the event. Table 7 demonstrates a broad range of interview structures (Merriam, 1998).

Table 7. Continuum of Interview Structures

HighlyStructured/Standardized	*Semistructured*	*Unstructured/Informal*
←	———	→
Wording of questions Predetermined	Mix of more-and less-structured questions	Open-ended questions
Order of questions predetermined		Flexible, exploratory
Oral form of a survey		More like a conversation

(Merriam, 1998)

As the continuum demonstrates, the unstructured interview is more directed to exploratory research. This method is useful when little is known about the phenomenon under study. The types of questions providing the best relationship between the study and domain

knowledge are open-ended questions. This type expands the knowledge base about the subject without hampering the information gathering based on structured, but erroneous questions.

There are several advantages and disadvantages in conducting interviews. Table 8 contains a subset of the advantages published by Hughes. Interviews:

Table 8. Advantages of Interviews

Obtain large amounts of expansive and contextual data quickly
Facilitate cooperation from research subject
Facilitate access for immediate follow-up data collection for clarification and omissions
Are useful for discovering complex interconnections in social relationships
Facilitate analysis, validity checks, and triangulation
Facilitate discovery of nuances in culture
Offer great utility for uncovering the subjective side

(Hughes, 1996)

The advantages listed in the table adequately demonstrate the benefits using the interviewing process in the current study. Because this study is exploratory and discovers aspects of a phenomenon, interviewing does have the advantage of extracting relevant data from the selected sample population. Telephone interviewing is also the most cost effective method of interviewing subjects in a large geographical area (Judd, 1991).

Table 9 contains the disadvantages as published by Hughes.

Table 9. Disadvantages of Interviews

Depend on the cooperation of a small group of key informants
Difficult to replicate
Procedures are not always explicit
Data often subject to observer effects; obtrusive and reactive
Dependent on the ability of the researcher to be resourceful, systematic, and honest; to control bias

(Hughes, 1996)

The limited disadvantages are more than offset by the utility and benefit provided by the process. The only concern is that a researcher may unintentionally affect subject responses causing suspect data.

Recording data is important to the interviewing process. There are three ways to record the interview: use a tape recorder, take notes during the interview, write notes after the interview (Merriam, 1998; Hughes, 1996). Since this study uses a telephone interview process and produces a tremendous amount of data, the third method is ruled out. Tape recording is the most effective in recording the subject's actual comments and can be replayed to ensure accuracy. This method, however, does have the tendency of initially making the subject nervous. Consequently, the interviewer took notes during the interview and typed the rest immediately following the interview to ensure completeness.

Interview Questions

The interview consists of a brief introduction of the study and the interviewer. This is followed by several demographic or general questions to properly frame the institutions in the study. Then 25 questions related to the specific constructs of the study are addressed. Each question was written to provide information to evaluate the five stated propositions. The questions are at Appendix A.

Summary

A qualitative research method based on an interactive, telephone conversation between the university representative and the researcher was used. To accomplish this, 25 questions were developed and validated to elicit the necessary information from the universities. The researcher

selected 55 universities to represent the larger population of accredited, four-year universities. The universities, listed at Appendix B, were selected because of their ability to provide the rich data required in the study. Of the fifty-five universities, twenty were randomly selected to participate in the study. The results of the interview are present in the next chapter.

IV. Findings and Analysis

Introduction

Fifty-five universities were selected to represent the greater population of institutions offering course credit for distance education courses. Of these, twenty universities were interviewed during the research. The university representative's comments were used to develop profiles to evaluate the research propositions and validate the ASM.

The universities included both public and private universities. The in-state annual (1997-1998) tuition for the interviewed universities ranged from about $2,000 to more than $20,000. The undergraduate student population of the universities ranged from about 4,500 to over 35,000. In addition, the schools ranged in rankings from several in the top 50 in the country to schools in the fourth tier (U.S. News Online, 1997). For this study, small schools are those that have 10,000 or less students. Medium schools have more than 10,000 but less than or equal to 20,000. Finally, large schools have more than 20,000 undergraduate students.

Based on the results, the interviewing institutions were grouped into two categories. One represented those institutions that were slow to adopt nontraditional assessment methods. The second group consisted of those institutions that more rapidly adopted newer assessment methods. The differentiation between the groups is based on the technology adoption tendencies expressed by the representatives of the schools.

University Profiles

Slower to Adopt

The characteristics of the group that tended not to adopt the more innovative or non-traditional assessments are shown in Table 10.

Table 10. Slow to Adopt

Slow to Adopt		
Region	**Size**	**Ranking (Tier)**
South	Large	2
North	Large	2
South	Small	3
South	Medium	3
South	Medium	3
South	Medium	3
North	Small	4
East	Medium	4
South	Large	4

In general, the group of universities listed in Table 10 are concerned with security issues as the primary consideration with regards to assessments in distance education. As a group, they tend to be risk averse. In five of the schools, security issues appeared to be paramount in determining their decision not to pursue new possibilities in distance education. The representatives from these schools used descriptions such as: "they do not know if the student's cheating"; "this is a show-stopper, too many dangers"; "put the distance education students through the ringer"; "they do not discuss new assessments because they cannot get that far because of security"; "they are going to wait until they get down the road"; "they could only do electronic testing if it were proctored"; and "no infallible way to detect or prevent cheating."

A second notable area of consideration was the idea of inertia. Representatives from six of the nine schools mentioned this as preventing progress in the use of technology in the

assessment process. In one of the six, the sheer size of the university was noted as causing stagnation of progress. In another of the six, the faculty had to be frequently reassured they were in control of the class and that technology would not be used or allowed to encroach upon that domain. Still further, representatives from the three remaining universities mentioned this phenomenon as slowing or retarding the adoption of new technology.

Technology concerns constituted a third important issue as viewed by the sample as a whole. Representatives from five of the nine schools indicated that the schools were limited in technology capabilities and faculty abilities. Representatives from the four remaining schools indicated that they had sufficient technology to complete the job but did not indicate the ability level of the faculty. The technological capabilities and abilities of this group of schools were varied but tended to be limited. These limitations included limited availability of the technology to faculty and limited infusion of technology into course curriculum. The limited abilities are in terms of the faculty's computing knowledge and expertise. This group's courses, while making some use of technology, remained more technologically limited than the second group's courses. The first group also tended to focus more on the mechanics of technology than on the pedagogical implications of the technology. The technology limitation issue was also more prevalent in southern schools than in schools in the other regions of the country.

Administrative issues were the fourth most paramount issue. Compared to the second group, faculties were not encouraged to utilize technology to enhance the learning experience. Faculty training and access to computing resources were also significant concerns to all of these schools. Representatives of two schools specifically mentioned the need to build and maintain a support staff for the faculty. Representatives in five of the nine schools discussed the increase in faculty workload from distance education courses as contributing to the university's problems.

Cost issues were presented as the least significant issue in this group. However, costs tended to be much more significant for this group than to the second group. Representatives from three of the schools thought financial matters were extremely important and two thought that costs were not important. The remaining four were somewhat concerned.

Quicker to Adopt

Table 11 lists the schools who are quicker to adopt the more innovative or non-traditional assessments.

Table 11. Quicker to Adopt

Quicker to Adopt		
Region	**Size**	**Ranking (Tier)**
Northeast	Medium	1
Mid-west	Large	2
East	Large	2
Mid-west	Large	2
Mid-west	Large	2
East	Large	2
East	Small	3
Mid-west	Medium	3
West	Medium	3
Northeast	Small	4
West	Small	4

The quicker to adopt group is also primarily concerned with security issues but not to the degree of the first group. They tended to discuss the issue as requiring resolution or some consideration rather than as an insurmountable obstacle. How each school addressed the security issue was quite varied. Many school faculties mitigated the concern over who the test taker is by building the assessment process from the beginning with distance education in mind. For example, instructors greatly reduced the use of midterms and finals. Projects, electronic discussions, and context-sensitive experiences were used as evaluation tools. Also, randomly

generated, equivalent exams were used to prevent two students from receiving the same exam. One school's representative indicated a student might be able to find someone to cheat for a student in one course but not for an entire degree. Another school's representative mentioned that in an electronic setting, a student would need to receive illegal assistance from day one or else the instructor could see the disparity in writing and intellectual styles during the term.

Administrative issues were the second most substantial concern for this group. In this category, the faculties were encouraged to utilize technology to enhance the learning experience more so than the schools in the first group. Faculty training and adequate support staff were of significant concern to all of the schools in the group. However, four school representatives specifically mentioned the support staff. A support staff is needed to provide the level of services required by the faculty to create the product desired. In some situations, it is the staff that directly allows a quality product to be created. Faculty at five schools in this group spent time and money determining how best to demonstrate a student's mastery of the material. Just as in the two schools in the first group, this evaluation process is an important issue that can produce pedagogical changes in the future.

Technology concerns were the third most important issue as viewed by this group of universities. The technological capabilities of this group are more substantial than the first group. Representatives from eight of the eleven schools indicated the infrastructure is in place and provides the required level of capability. Although representatives from six of the eleven schools specifically mentioned student capabilities, there were fewer self-imposed limitations due to the student's computing capability as compared to the first group.

The fourth area of significant consideration was the issue of inertia. Similar to the first group, representatives from three schools mentioned inertia as slowing or retarding the adoption

of new technology. However, representatives from seven of the remaining schools in the group indicated that they would not and do not resist pedagogical changes associated with the infusion of technology into the curriculum. The representative from the eleventh school did not mention this issue. This group tended to be more open to the technology available and more willing to employ the technology. The faculty in this group tended not to be as resistant to changes in delivery methods. Of course, this tendency was more pronounced in some schools than in others.

Cost issues appear to be the least significant issue for this group. Representatives from only two schools thought financial matters were extremely important. Representatives from three schools believed that cost played a minor role. Representatives from the six remaining schools indicated that cost was not significantly important. This group also tended to focus on the opportunity costs of the new technology and take a long-term perspective. Specifically, costs were viewed as decreasing in the long run as overhead and indirect cost pools were reduced.

Table 12 summarizes the universities and the chosen order of importance of assessment selection issues.

Table 12. Summary of Schools and Issue Order

Slow to Adopt			Quicker to Adopt		
Region	**Size**	**Ranking (Tier)**	**Region**	**Size**	**Ranking (Tier)**
South	Large	2	Northeast	Medium	1
North	Large	2	Mid-west	Large	2
South	Small	3	East	Large	2
South	Medium	3	Mid-west	Large	2
South	Medium	3	Mid-west	Large	2
South	Medium	3	East	Large	2
North	Small	4	East	Small	3
East	Medium	4	Mid-west	Medium	3
South	Large	4	West	Medium	3
			Northeast	Small	4
			West	Small	4
Issue Order			**Issue Order**		
Security			Security		
Inertia			Administrative		
Technology			Technology		
Administrative			Inertia		
Costs			Costs		

Propositions Explored

Proposition 1

P1: Security issues create a level of comfort with the existing assessments and will reinforce the institution's current form of assessments.

The proposition was supported by the data. Representatives from all universities mentioned security issues as points of concern and virtually all touched on the potentially limiting factor that security concerns cause. Security concerns ranged from being a barrier to not really being a concern but something requiring attention.

At one end of the spectrum, security is such a sensitive issue that faculties felt that they cannot risk security breaches by trying new technologies. For example, a representative from a small eastern school mentioned that security was so significant a concern that local students were

required to come on campus to complete some assignments. The representative from the school admitted that this is certainly not what distance education is fully capable of -- complete independence of the campus. A representative from a small southern school indicated that there are simply too many dangers involved with electronic assessments.

At the other end of the spectrum, representatives from several schools felt that they have addressed the issue satisfactorily and the security provided in the distance education arena is equivalent to that in the classroom. Representatives from two mid-western universities, one large and one medium sized, stated that although they do not know with certainty who is at the other end of the keyboard, they also do not know if all 300 students really belong in the lecture hall taking an exam. This suggests a possible double standard. Are distance education courses and faculty held to a higher security standard than their on-campus counterparts? Representatives from two schools mentioned that same concern. The representative from one of the two schools said distance education fights to maintain credibility and cannot afford any security breeches. The representative from the second school talked about its reputation being judged when a graduate is interviewed for a job. This representative from the distance education program felt that it could not sustain its reputation if it had a graduate that did not know what he or she was supposed to know.

Between the two ends of the spectrum are the remaining universities. The differentiation of universities and their location on the spectrum is more related to specific security concerns and how these concerns were mitigated and less with the pursuit of perfect security.

Representatives from five schools specifically mentioned concerns for hackers or students illegally entering and manipulating the computer systems or data files, including exams. To counter this issue, the instructors either limited the information available or use personal

logins and passwords to mitigate the risk. The five schools included small, medium, and large mid-western universities, a medium southern school, and a small eastern school.

Representatives from twelve schools specifically indicated that they are concerned with knowing who is at the other end on the keyboard. The ways that schools resolved the identification issue were varied. The representative from one medium sized northeastern university advanced the idea that a professor could know a student much better in the electronic environment than the lecture hall environment. Because an instructor reading and discussing course material in a chat room, virtual room, or using other real-time or asynchronous communication methods would be more familiar with the student's opinions and writing skill than in a more passive lecture environment. In addition to the discussions, each course has several projects or writing assignments for the student to complete. During the course of the student's assignments, the instructor will receive indicators about the grammatical abilities, intellectual level, problem solving process, and word choice the student displays. Consequently, when an exam or assignment is done, the instructor should be able to detect significant variations that would be caused by someone other than the student completing the assignment. In the lecture hall, the student may not say anything or very little. Then when it comes time for a test or a written assignment, the professor really has no basis from which to evaluate whether the student is capable of such work.

This insightful method of recognizing quality variations in a student's work is an interesting perspective. However, it places an enormous burden on the professor. The professor must be intimately involved with the students and their assignments. Representatives from several universities indicated that the faculty is already inundated with work and might, therefore, not select this method.

Representatives from eight schools raised another issue; how can one be sure that the student did not use additional materials for the exam? This concern is alleviated differently by the various schools. Two schools, a large eastern and medium mid-western university, simply require students to go to an approved computer lab. This method provides the desired proctoring services that the school feels will ensure that the student acquires no advantage. Two eastern schools, one medium and one small, use time limits for the test duration. This, they feel, will produce sufficient assurances that the student must come prepared.

A small eastern and a small western school minimizes student cheating by asking questions that require student's experiences to be discussed within the context of the course material or projects. These two universities also make extensive uses of projects, both individual and group. The faculty of the eastern school also requires telephone contact between the students and faculty during the term. The telephone contact is design to build a rapport that will provide a more personal relationship. The representative from the school believes it will reduce potential security problems.

Representatives from five schools mentioned that the faculty is concerned with the issue of copyrights. The faculty is concerned with producing electronic materials for courses and then having the material made available to the larger population with no royalty or financial consideration for themselves. Additionally, one of the representatives indicated that information available on the WWW almost certainly guarantees the information will be duplicated many times over. One medium sized southern school discussed a different perspective on this issue. Is a faculty member primarily responsible for transmitting subject matter? Or is a faculty member's primary responsibility to certify the mastery of subject matter? This later perspective changes the focus from the preoccupation with developing and delivering the course material to more

thoroughly evaluating mastery of the course material by the student indicating an interesting shift in perspective. A student or non-student could benefit from reading the course material on the Internet, but could, in no way, receive college credit from obtaining the material. For the student to receive the credit, the student must enroll and demonstrate mastery.

One small northern school was concerned with foreign cultures and their perception of cheating. As Internet courses become more prevalent and people of other cultures take more and more courses from American universities, schools should be concerned with other cultural aspects and beliefs of security and cheating.

One large northern school said that the faculty sometimes puts the distance education students through more stringent security measures than they do for on campus students. The faculty members wanted to be very sure that the student getting the grade was the student taking the exam. The representative of the school also stated that the faculty wanted, in essence, to ensure that there was no possible way that a student could cheat.

Proposition 2

> **P2:** Faculty members and the institution's leadership perceive that the administrative requirements of computer-based assessments are greater than those of current assessments and this will reinforce the institution's current form of assessments.

This proposition is supported. The interviews revealed two significant concerns with respect to administrative issues that seemed to hinder the use of different assessments. Representatives from eight universities specifically mentioned the first, quality of the assessment. Secondly, the representatives from six of the schools explicitly mentioned the need for a support staff to assist the faculty.

Representatives from six schools of various sizes and geographic locations felt that assessments reinforce educational integrity and should be the foremost consideration.

Additionally, the process of creating an academically sound assessment is difficult. Representatives from two universities expressed doubt as to whether the faculty were as capable of developing adequate assessments as they should be.

Representatives from eight of the universities indicated that delivering distance education courses is labor-intensive for the faculty, in particular, for courses with projects requiring frequent interaction between the instructors and the students. Consequently, several schools experienced difficulty enticing faculty to teach these courses. The faculty resisted the additional workload in teaching and giving exams. But several schools also indicated that if the faculty could be convinced of the time savings that comes with using technology in the assessment process, the faculty might be more willing to use electronic assessments in the distance education courses.

Representatives from four schools explicitly denounced the electronic, multiple choice exams as not being representative of the pedagogical changes that are possible. The faculties from these schools were sensitive to the issue of simply replacing a paper-based exam with an electronic exam. The faculties advocated a new look at the curriculum content, an evaluation of the technological changes possible in teaching, and the technological changes that are possible for assessments. Representatives from two highly ranked schools said that the technology changes are allowing them to do things they never could have done before.

Proposition 3

> **P3:** New technology provides an unknown and unproven capability to the institution, but as the technology becomes more prevalent, an institution may alter the types of assessments such that newer technology will be utilized.

The proposition is supported. Representatives from nine of the schools expressed strong apprehension toward using technology-enabled assessments. Prevalence of computing

technology for the students and/or faculty is an important concern of fourteen schools. Interestingly, the security aspects of the new technology are causing the initial apprehensiveness as opposed to the cost or the acquisition process in the university.

The two most significant issues in this area are concerns that the students must have access to sufficient technological capabilities and the faculty must receive training to use the technologies. Representatives from seven schools indicated technology was driving, or at least encouraging, universities toward electronic assessments. These schools varied in geographic location and size. Representatives from several of the remaining universities shared the idea but were less enthusiastic. One recurring limitation mentioned by the schools' representatives was in the area of laboratory sciences. The concern is, essentially, how can one access laboratory performance at a distance? One remedy was to take a laboratory kit to a site and complete the assessment.

Representatives from eleven schools specifically addressed the technological limitations of the students. Financially, a student is less able to acquire sufficient computing capability in terms of hardware, software, and communications infrastructure than a university. Consequently, there are limitations to the current assessment capabilities. This limitation mandates schools to conduct electronic assessments via the lowest technological denominator of the students, sites, or laboratories involved.

The second area of concern is in faculty training. Representatives from seven of the schools indicated that their faculties were inadequately experienced in the use of technologies such as authoring software, electronic mail, or interactive chat rooms. Representatives from three of the schools said many of the faculty members did not have computers. In addition, many of those having computers were connected to neither a local network nor the Internet.

Representatives from the same schools also indicated there was insufficient communications infrastructure on a campus-wide scale. Representatives from four other schools, however, indicated that they have abundant resources, sufficient communications infrastructure, and adequately trained faculty. The cause of the disparity is out of the scope of this research but, the size and academic rankings were very different between the two groups.

There is also a smaller group consisting of one medium southern school and a medium eastern school that are not sure the technologies, including the Internet, are sufficiently mature to depend on them for course instruction or assessments. One faculty indicated several experiences had caused mistrust of the technology by the school.

Proposition 4

> **P4:** Current assessments have known costs and are likely to be favored unless costs of an alternate assessment are sufficiently lower to alter the affordability and desirability of the current assessment.

The data from the interviews weakly supports this proposition. A representative from only one school, a small northern school, indicated it could not afford the costs of alternative assessments. The remaining representatives, each to varying degrees, indicated the cost of assessments is generally the least significant issue for assessments. In fact, the representative from one school said cost might be what is heard about most but is the least important issue. However, four schools specifically mentioned the long-term cost savings as compelling the schools to pursue different assessments.

Although cost is relatively insignificant, two main issues dominated the discussions. They were costs related to faculty compensation and the fact that some distance education departments receive limited public funds. The cost issues relating to the faculty compensation scheme was discussed most often. Representatives from three schools talked about the cost of

developing, refining an assessment, and validating assessments. But, representatives from four schools felt the new assessments would, in the long-run, lower overhead costs, decrease postage expenses, and substantially reduce the instructor-student time factor in distance education course assessments.

A representative from one school indicated the method of compensating the faculty prevented the creation of an economical, electronic course. The school pays the instructors on a per-term basis. That is, an instructor creates and conducts an electronic course for a specific term. The course is the faculty's property and must be paid again to create and deliver the course in the future. Another school remedied this situation by paying a faculty member to create a course. Then each time the course is used, a faculty member is hired to deliver the course.

Representatives from four small and medium universities stated that distance education funding was limited, in whole or in part, to receipts from enrollments in the distance education courses. This funding model creates a situation where courses are developed to satisfy a specific demand. Satisfying the demand makes it incumbent on the staff to conduct the market research to ensure the course and assessment will, in fact, generate sufficient enrollments to cover development and delivery costs. Obviously, the university must be able to deliver the course and assessments within a reasonable cost range or it may price itself out of the market.

Proposition 5

> **P5:** Inertia in an institution will reinforce the current assessments used within the institution and will not alter from this course unless technology or cost issues provide sufficient motivation to do so.

This proposition is strongly supported by the universities in this research. Representatives from sixteen of the universities suggested that faculty will not, in varying

degrees, support changes to pedagogy or the assessment process. Faculty in the remaining four schools are encouraged and motivated to utilize new forms of student assessments.

A representative from one medium southern school indicated that the faculty did not see a way to chart a new course. Consequently, the faculty is content with leaving the curriculum alone and letting the school wait until they retire before changing. Unfortunately, this is not an isolated opinion in the universities sampled. Tenured faculty are concerned that the rules that they agreed to are changing without their control. The faculty's concern adds to the resistance to change, whether the change is positive or negative.

A representative from a medium sized eastern school states the faculty is very traditional and they want to keep things just as they have always been. Further, a representative from a large mid-western school said that the faculty has the tendency to stick with the tried and true methods instead of venturing into the unknown.

A representative from a medium sized eastern school indicated it is happy with traditional assessment methods. The representative added that it has found little reason to replace paper assessments with electronic assessments. Representatives from two universities said it was a tough job to get the faculty acclimated to new technology. A representative from one large northern university said the university does not say that it will not change, it just does not. The same representative revealed that if the faculty itself wanted the change, then it would change.

In some instances, members of the faculty are attempting to incorporate technology into the courses. However, the attempt is proving to be problematic. In one instance, a professor conducted the same course on-campus and via distance education. The instructor had several readings on reserve at the library for the on-campus students. When the instructor taught the

course via distance learning, the materials on reserve at the library were only available to local students.

Summary

The interview data rather clearly delineate two groups of schools. One group tends to be more reluctant to incorporate new technologies into the assessment process, primarily because of security concerns. The second group tends to incorporate new technologies by mitigating the security risks associated with remote, electronic exams. However, representatives from schools in both groups discussed the same issues. Essentially, the focus and relative importance were different.

Overall, the propositions were supported though proposition four was only weakly supported. In general, the propositions supported the ASM indicating that although the literature review did not specifically address the issues, it did, in aggregate, provide insights into what universities would view as significant issues.

The next chapter concludes the research by reviewing the research questions, providing additional findings, making recommendations, and indicating avenues for future research.

V. Conclusions

Introduction

This study looked into the issues that influence a university's decision making process concerning student assessments in distance education curricula. Primarily, this study provides insights into the fact that many universities use advanced technologies to deliver course instruction and materials but do not, as a rule, use these same technologies to gather assessments.

The background literature details the long tradition of distance education and its place in the academic world. As technology has matured over the years, so has the delivery methods for course instruction. Today, satellites and the Internet are the latest delivery methods in the technology arena. Within these two delivery conduits, there are a variety of implementation innovations that some universities are exploring. These new technologies are used to deliver course instruction and some universities use the technologies to conduct student assessments. However, many universities do not. Because the literature does not address why many universities do not conduct student assessments using these new technologies, this research was designed to find out why.

Review of Current Literature

From the current literature, the study identified essential constructs for creating an assessment selection model. The literature concerning assessments covered a wide range of issues, but did not specifically reveal the factors that institutions are concerned with when deciding the acceptable types and delivery methods for assessments. The literature offers a great deal of information on the methods to develop, validate, and use assessments. The literature also discusses the positive and negative aspects of the various types of assessment questions

including ways to improve assessments. Additionally, the literature discloses research on the use of computers in the classroom. However, the research discusses computer usage as it benefits instruction or usage as a training tool as opposed to student assessments (Spencer, 1996; Crumb, 1990). The research also reflects faculty computer use as essentially automating current instruction methods and not affecting pedagogy.

The literature provided 29 issues in various subjects and degrees of applicability to the current research. The 29 issues were evaluated and categorized into five broad categories. The categories are technology issues, administrative issues, inertia issues, security issues, and cost issues.

Technology issues are concerned with the technological capabilities available to the institution to deliver the assessment to the student. The technology issues are: future use of technology; sufficient technical knowledge; Internet access; physical transmission of assessment; and web-capable software.

Administrative issues deal with the faculty's time and efforts to create, maintain, deliver, and score an assessment. The administrative issues are: faculty perception of computer-based testing; assessment development, maintenance, and scoring; course material coverage; assessment difficulty; delivery methods; validity and reliability.

Inertia is the tendency of an institution to resist changes and maintain the status quo. These issues also encompass the institution's concern with enhancing or maintaining its academic reputation. The inertia issues are: pedagogy changes; reputation; strategic vision; academic rigor; standards; institution politics.

Security issues are concerned with the institution providing a secure environment for the creation, storage, delivery, and scoring of an assessment. The security issues are: security

software and hardware configurations; password and restrict assess; assessment security; physical environment; cheating.

The last category, cost, addresses those issues that are associated with the assessment costs and the costs required to provide the assessment to the students. The cost issues are: delivery costs; hardware and software costs; assessment development and maintenance costs; costs to implement strategic plan.

Methodology

This is an exploratory study primarily because this problem is not described in the literature. Consequently, the approach was to develop a useful model (ASM) for describing the assessment selection behavior of academic institutions. The study then produced the descriptive data required to evaluate the Assessment Selection Model , located in Figure 1 in Chapter II.

Interview questions, located at Appendix A, were developed to query the selected institutions for issues about the assessment selection process. The telephone interviewing technique was employed to elicit the data. This technique produces rich data very appropriate for this type of study. The sample was selected because they are normal subjects not indicative of extreme tendencies or views. Of the 55 universities, 20 were interviewed. To ensure anonymity of the participants, the identities of the schools interviewed are not identified.

Research Questions

The research questions postulated at the beginning of the research were answered during the study. The data supported the five propositions which in turn supported the ASM. The research questions and answers are as follows:

Research Question 1

Does the ASM provide insights into the specific issues influencing an institution's decision on the type of student assessments and the acceptable delivery method? The Assessment Selection Model, shown in Figure 1 in Chapter II, proved to be useful in capturing the concerns of the universities. Further, the model encompassed the realm of interest from the universities' perspectives.

Research Question 2

Are there additional issues that institutions are considering that the ASM did not address? The Assessment Selection Model addressed the issues that the universities discussed during the interviews. When asked, the universities but did not provide additional issues to incorporate into the model.

Research Question 3

What is the relative importance among the issues that institutions feel are significant? The data indicated that there are two answers to this question. The responding universities are grouped into two divergent groups essentially divided on the intensity of the security issue. One group could be characterized as significantly risk-averse. Security concerns dictated, in essence, the limitations of the potential types of assessment types and delivery that would be used. The other group is characterized as risk-neutral to slightly risk-averse. This group tried new methods of conducting assessments, mitigated security concerns to the extent consistent with on-campus courses, and tended to take a pedagogical view of assessing learning.

Additional Findings

Reputation

Although the researcher anticipated concern over reputation would be the basis of the resistance, it actually seems to be tradition and school size. Based on the demographics of the schools interviewed, the larger the school the more lethargic the faculty. Specifically, schools with about 20,000 or more undergraduate students were particularly affected by this phenomenon.

Interestingly, the schools ranked among the highest, academically, in the country were the least concerned with the distance education program's reputation in regards to unproctored exams for distance education courses. The interviews revealed that from their perspective the university and faculty reputation provided the solid assurance that quality and academic standards would be maintained. Therefore, their solid reputation allowed them to conduct distance education courses and unproctored assessments without the fear of diminishing or tarnishing that reputation. These schools were more likely to and actually did conduct unproctored exams.

Other universities that ranked lower in the country, academically, seem to focus more on the potential damage to the reputation of the university if unproctored exams were used. The interviews indicated that these schools must be not only sure, but inordinately sure no possibility exists for someone to cheat on an exam. Consequently, many opportunities to alter processes to accommodate students or faculty will be curtailed or completely avoided simply because of this concern.

In essence, there seems to be an inverse relationship between academic reputation and the school's concern to conduct distance education courses and assessments in a certain way to

prevent a diminished opinion of the reputation of the school. For this study, the stronger the reputation, the less preoccupied the school will be that unproctored assessments will detract from the school's reputation. On the other hand, a lessened reputation correlated with an increased concern that unproctored assessments would detract from the school's reputation.

Security Standards

Security concerns also related to the reputation issue. However, the security standard discovered in the research is the tendency for distance education programs to implement dramatically more stringent security standards than those used for on-campus students. Typically, on-campus courses required students to present a picture identification card to take an exam. Identification cards can and have been created so that students can cheat for one another. In classrooms or lecture halls with many students, the faculty's ability to distinguish the true students from a proxy is excessively difficult. The ability to distinguish becomes increasingly problematic in a traditional one-way lecture format course. With little or no student-professor interaction, a professor will not necessarily know the student by name or ability. Some distance education programs focuses on creating rules and procedures to completely eliminate cheating. The normal method is to use one or more proctors.

The interviews, as a whole, indicated the most important security concern is to know, with certainty, who is at the other end of the keyboard. This is akin to knowing, with certainty, who is sitting in each and every seat in the lecture hall. Knowing this is desired but not entirely possible. The university is accustomed to accepting a reduced level of risk by requiring picture identification cards. However, some universities are not so inclined to use that reasoning in the

context of electronic assessments. For example, instead of a student presenting a picture identification card, the student uses a password and login.

Not all universities share the same level of anxiety concerning this issue. Some were content with knowing that adequate precautions were in place. Others will not be content until the student's environment is entirely secured. The level of contentment illustrates a dichotomous relationship as opposed to a fluid scale between the sample of universities. Eleven of the schools gravitated toward mitigating the risks and progressing as compared to nine of the schools refusing to accept the risks and consequently maintained the current methodology.

Mitigating the Risks

All of the universities mitigated known security risks by providing methods to assure the student's efforts and identity. The schools most concerned with the student's identity and origin of work used proctors to mitigate the risks of the unknown.

The universities that were less preoccupied with the student's identity and verification of the work are using various methods to reduce the faculty's concern. This lack of preoccupation should not be construed to mean that the faculties at these universities are not significantly concerned. They simply acknowledge the risks and use acceptable techniques to mitigate the risks. As previously mentioned, this mitigation strategy is the same method that faculty use for on-campus courses. They accept that a chance exists for a student to take an exam for another student. Consequently, a picture identification card is used to reduce the incidences of cheating and to raise the level of efforts required by the student to cheat.

One school has a requirement for at least three telephone calls between the faculty and each student during the distance education course. The telephone contact creates a more

personal relationship between the instructor and student, thereby reducing the tendency for the student to cheat. The telephone contact also adds to the instructor's knowledge about the student and will give the instructor a better feel as to the student's abilities.

Another school utilizes frequent electronic communications between the instructor and students during the course. There are frequent electronic classroom meetings where students share information on the topics of the course. The instructor has an electronic record of the communications from each of the students. As the course progresses, the instructor is better able to discern the student's ability. Accordingly, the instructor recognizes projects or documents that are out of the student's range of abilities. The underlying assumption is the student will not dramatically alter grammatical usage, intellectual approach to completing a project, or problem solving skills. In this way, the instructor can estimate whether students are submitting their own work. This technique assumes that the class size is sufficiently small to allow that level of effort by the instructor.

A similar situation exists at another school. This school believes that frequent communication between students and instructors encourages the students to provide their own work. The representative from the university conceded that someone may cheat on an exam and go undetected, but it is unlikely that the student could get someone to be a substitute during an entire course. The representative also indicated that it is unlikely that a student can get others to cheat for the student for the duration of the degree program.

Some universities use group and individual projects, papers, and exams as evaluation mechanisms for courses. The universities that used electronic exams tended to not use multiple choice exams. The schools normally use questions that require thought and interpretation in contrast with questions requiring recognition or memorization of the course material. The

interpretation questions will require the student to inject class experiences or life experiences to personalize the answers. By requiring more substantive answers, it lessens the possibility for students to use substitutes or receive assistance.

Faculty

With few exceptions, the faculty were described as being resistant to technology and generally unwilling to move forward in that regard. The tendency to resist technology was less pronounced in private as opposed to the public schools. Additionally, as indicated by the representatives from the six southern schools, the resistance was much more pronounced among southern universities.

Representatives from several schools identified methods that were being used to reverse this trend. Administration from one school required each new faculty member to develop an electronic course and learn the technology involved. In this way, the administration hoped to reduce the resistance to new methods of approaching the educational experience.

Intellectual property rights was also an issue that seems to be critically important to the faculty at many of the public universities, especially tenured faculty. Representatives from several universities mentioned that attracting new faculty to distance education courses was probably difficult because of this issue. Faculty compensation models are closely related to this issue. Representatives from one institution disclosed that they have significant problems with tenured faculty refusing to create electronic courses because of the loss of compensation for the subsequent uses of the course. The same representative indicated that faculty must be frequently reassured that the course is their domain.

Recommendations

The research suggests that there is no single, best way to conduct assessments. Composition of the student population is a significant factor. Representatives from three schools mentioned that students of different age groups demonstrate dissimilar levels of integrity and professionalism. Distance education courses have an average student age above that of on-campus courses, although the gap is narrowing. In addition, the technology available to students within a university and the technology available to students of different universities can limit each school's infusion of technology into its distance education program.

However, the methods that other universities used to mitigate the risks should be evaluated for possible incorporation into the program of each school. This idea is similar to a best-practices scenario. Nevertheless, the culture and faculty tendencies of the school are a major consideration for making any changes or suggestions. Assessments in the distance education program should balance convenience, academic standards, and ability of the assessment to elicit the student's true mastery of the material.

Limitations of the Research

The level of literature covering this particular subject limits this exploratory study. Consequently, the Assessment Selection Model may be insufficient to address the issues of concern for universities' assessment selection decisions.

This research selected a subset of universities listed in two books. A fundamental assumption of the study is that the fifty-five selected universities are representative of the greater population of universities offering distance education. Additionally, because data collection was limited to twenty interviews, generalizability is limited.

Finally, because the study was conducted by a single researcher, biases could be present. Furthermore, the personal interviewing process may have inadvertently limited or focused the answers from the university representatives causing the study to receive incomplete information.

Suggestions for Future Research

During the course of the research, there were areas uncovered that require additional research.

First, research should be conducted to ascertain the actual propensity of students to cheat in distance education environments, particularly in electronic courses. From the interviews, there is an underlying assumption that students will cheat. This assumption seems to be a significant presumption that may or may not be substantiated. The typical demographic data on a distance education student is markedly different than an on-campus student. There are studies on student cheating, but they focus on students in classrooms.

Secondly, many universities were concerned with the computing capabilities and abilities of the students. Capabilities refer to the hardware and software equipment and the telecommunications connectivity available for the student, whereas the abilities of the student refer to the student's aptitude and ability to use the technology for the course and assessment. The school is forced to the lowest common denominator of the group of students the university has as its target population. Therefore, research into the capabilities and abilities of distance education students would benefit the universities at large.

Finally, this research looked into accredited, academic universities and their perspectives. Research should be directed at schools with training programs to reveal their perceptions about the same issues or determine if they have different issues affecting them. From a cursory look

into these schools, they seem more liberal in the area of security requirements. It would be interesting to identify what mitigating techniques they used for the risks involved.

Appendix A: Interview Form

Introduction of Author:	My name is Clayton Sammons. I am a graduate student at the Air Force Institute of Technology in Dayton Ohio.	
Purpose:	I am conducting research concerning institutions' decision-making policies with regards to choosing individual student assessments used in the distance education course curriculum. The information that you give me will be used to test a model of an institution's assessment selection behavior. I ensure your anonymity for all of your responses and will not specifically mention your name in the research document. I will also provide you an executive summary of the findings, if you wish.	
Overview of Interview:	There are two sections of questions for the interview. Section one contains general questions about your institution and section two has specific questions relating to assessments and issues concerned with various aspects of assessments. I will take notes of your responses during the interview and I ask for your patience as I ensure completeness.	
How You Were Selected:	You were selected from several books listing academic institutions conducting various types of distance education. From that, I randomly selected 20 institution's to contact.	
Time Required:	This interview should take no longer than ____ minutes.	
Time of Interview:	Began:	Stop:
Day of Interview:		
Attitude of Interviewee:	Cooperative _____ Neither cooperative or uncooperative _____ Uncooperative _____ Other _____	
Call Back?	If this is not a good time to talk, I can call back at a more convenient time. Date: Time:	

If Not The Right Person, Who?	Name: Number: Position:	
Are there Questions Before We Begin?		
Receive from interviewee:	Full name Position Address E-mail address Phone number Institution Alternative contact Years in academia Years in current position	

Section 1.

First, the nine general questions related to attributes of your institution's distance education program.

1. Does your institution provide distance education courses? (Y/N)

2. What kind of subject areas does your institution offer using distance education?

3. Does your institution provide distance education courses via the Internet? (Y/N) Why or why not?

4. What method does your institution use to distribute course information for the distance education courses? (E-mail, videotapes, Internet, teleconferencing,)

5. Does your institution conduct proctored or unproctored assessments? Proctored assessments are those that students complete under the direct supervision of a designated or approved individual. Unproctored assessments are those that the student completes without supervision. This does not eliminate restrictions on the student behavior but simply means that the student is not supervised during the completion of the exam.

6. Do the methods of delivering course assessments correspond to the delivery method of the course instruction? For example, if course material is delivered via the Internet, is the student's course assessment also delivered via the Internet?

7. What type of assessment questions does your institution use for the distance education courses? Possible types include multiple choice, true/false, essay, short answer, group projects, individual projects, etc.

8. Who are the decision-makers at your institution that establish the acceptable assessment types and delivery methods? (Instructors, deans, board, etc.)

9. Are there differences between the acceptable types of course assessments for the on-campus courses and the distance education courses? What are they? Why are they the same or different?

Section 2.

Secondly, I have a few questions related to the decision-making behavior at your institution concerning the types of individual student assessments and delivery methods used in your institution's distance education program. I need you to think about your institution with its programs and institutional policies and procedures used to make decisions about assessments. For this research, you may think about tests, examinations, and assessments interchangeably as long as it relates to a single student in a course.

1. What are the issues that prevent your institution from attempting innovative assessment methods, i.e. maintain the status quo?

1a. Based on these issues, what factors prevent your institution from implementing new or different assessments types or delivery methods?

2. What are the technological issues or limitations that your institution is concerned with when deciding what types of assessments will be approved for your institution? By technological issues, I mean those issues that are concerned with the technological capabilities available to the institution to deliver the assessment to the student.

2a. Based on your technology issues, what factors prevent your institution from implementing new or different assessment types or delivery methods?

2b. What role do technology issues tend to have in your institution that either keep the same types of assessments or change to new types of assessments?

3. What are the cost issues or limitations that your institution is concerned with when deciding what types of assessments will be approved for your institution? By cost issues, I mean those issues that are associated with the costs of the assessment and all of the costs required to provide the assessment to the students.

3a. Based on your cost issues, what factors prevent your institution from implementing new or different assessment types or delivery methods?

3b. What role do cost issues tend to have in your institution that either keep the same types of assessments or change to new types of assessments?

4. What are the administrative issues or limitations that your institution is concerned with when deciding what types of assessments will be approved for your institution? By administrative issues, I mean those issues that encompass the faculty's time and efforts to create, maintain, deliver, and score an assessment. This would also include all of the features required of an academically rigorous assessment.

4a. Based on your administrative issues, what factors prevent your institution from implementing new or different assessment types or delivery methods?

4b. What role do administrative issues tend to have in your institution that either keep the same types of assessments or change to new types of assessments?

5. What are the security issues or limitations that your institution is concerned with when deciding what types of assessments will be approved for your institution? By security issues, I mean those issues that are concerned with the institution providing a secure environment for the creation, storage, delivery, and scoring of an assessment.

5a. Based on your security issues, what factors prevent your institution from implementing new or different assessment types or delivery methods?

5b. What role do security issues tend to have in your institution that either keep the same types of assessments or change to new types of assessments?

6. Are there any other issues that affect the selection decisions at your institution that have not already been covered?

7. Of all the issues that you have discussed, which are the most important to your institution?

Appendix B: Sample Population

1. University of Alabama
2. University of Alaska
3. University of Arizona
4. University of Arkansas at Little Rock
5. University of California
6. Colorado State University
7. University of Delaware
8. Empire State College
9. University of Florida
10. University of Georgia
11. Georgia Institute of Technology
12. University of Idaho
13. Indiana State University
14. Indiana University
15. University of Iowa
16. University of Kansas
17. Kansas State University
18. Louisiana State University
19. University of Maine at Augusta
20. University of Maryland
21. Western Michigan University
22. University of Minnesota
23. University of Missouri
24. University of Montana
25. University of Nebraska at Lincoln
26. University of Nevada
27. University of New Hampshire
28. New Jersey Institute of Technology
29. New School for Social Research
30. New York University
31. University of North Carolina
32. University of North Dakota
33. Nova University
34. Ohio State University
35. Ohio University
36. University of Oklahoma
37. Oklahoma State University
38. Old Dominion University
39. Pennsylvania State University
40. University of Phoenix - San Francisco
41. Portland State University
42. Purdue University
43. Rochester Institute of Technology

44. University of South Carolina
45. University of South Dakota
46. University of Southern Colorado
47. University of Tennessee
48. Texas Tech University
49. University of Texas
50. University of Utah
51. University of Washington
52. Washington State University
53. University of Wisconsin
54. University of Wyoming
55. Brigham Young University

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Vita

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13. ABSTRACT (*Maximum 200 Words*)

This thesis discovers issues universities use when deciding what types of exams will be used for distance education students. Many universities conduct distance education courses electronically but do not conduct the evaluation instruments electronically. Universities across the country, diversified by academic rankings, tuition, and student population were interviewed. Results generally revealed security concerns as the most prevalent reason for universities avoiding electronic exams. However, some universities have created evaluation methods to mitigate the security risks and perform electronic assessments such as projects or exams that are tailored to reduce the possibility of cheating. Examples of the tailored exam questions include requiring students to interpret material discussed during the course, using questions that require more than looking up answers in course material, or asking personal questions that only the student should know. These are not foolproof, but do lessen the risk of cheating.

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